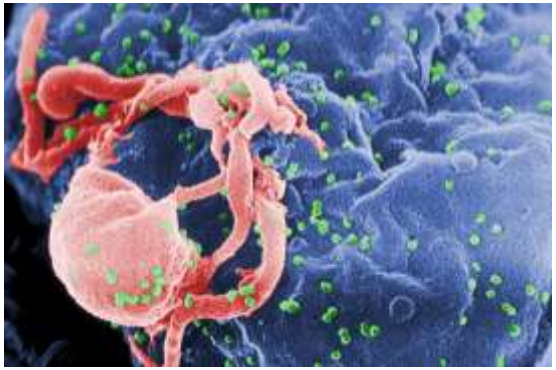
HIV infection:
our Current Understanding of the Transmission of HIV and Global Situation



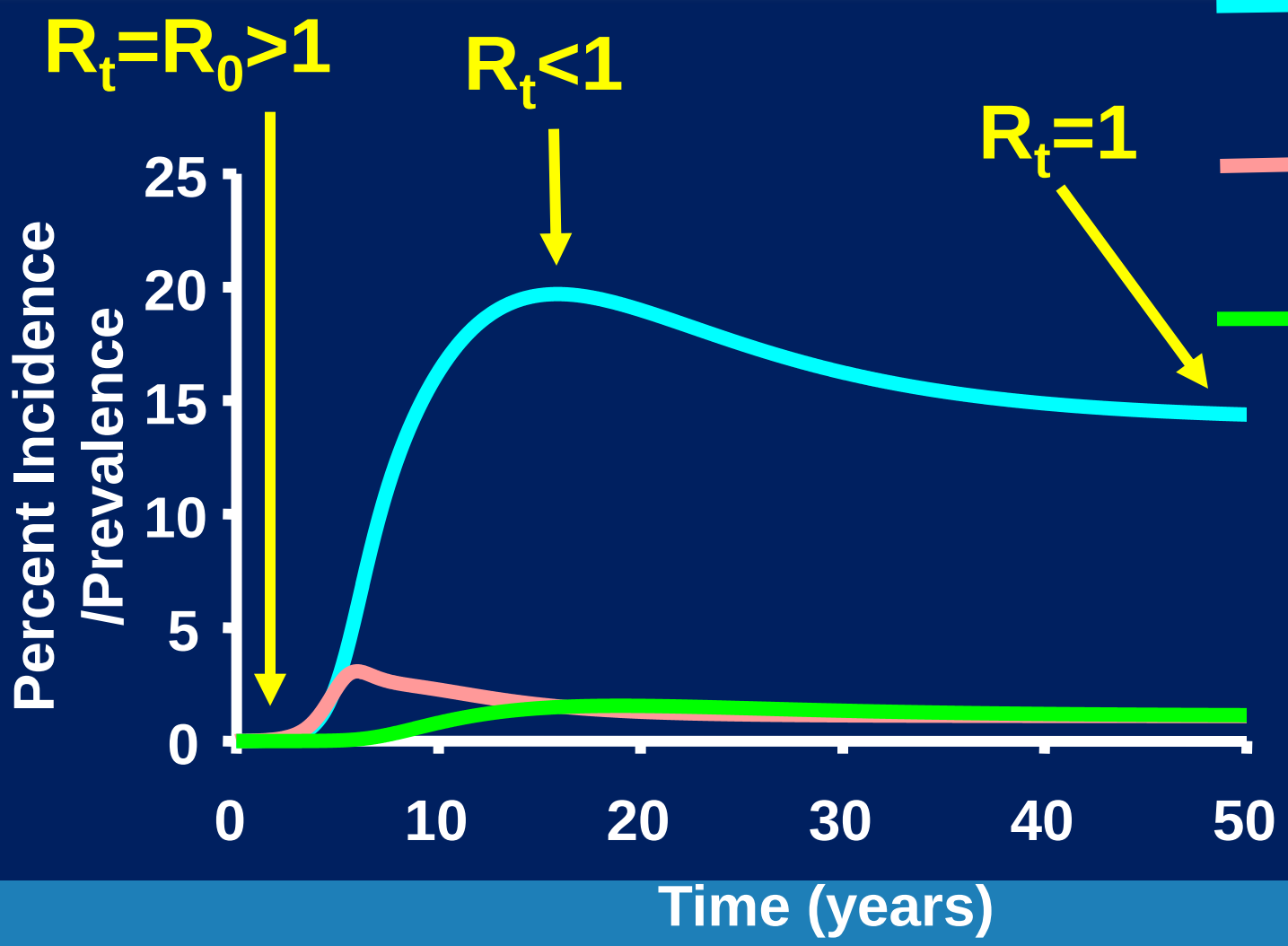
Outline

- HIV transmission factors
- HIBV global epidemiological overview
- Some data in the national response
- What are the current issues

Outline

- HIV transmission factors
- HIV global epidemiological overview
- Some data in the national response
- What are the current issues

The natural course of incidence and prevalence of a local HIV epidemic over time



Prevalence HIV

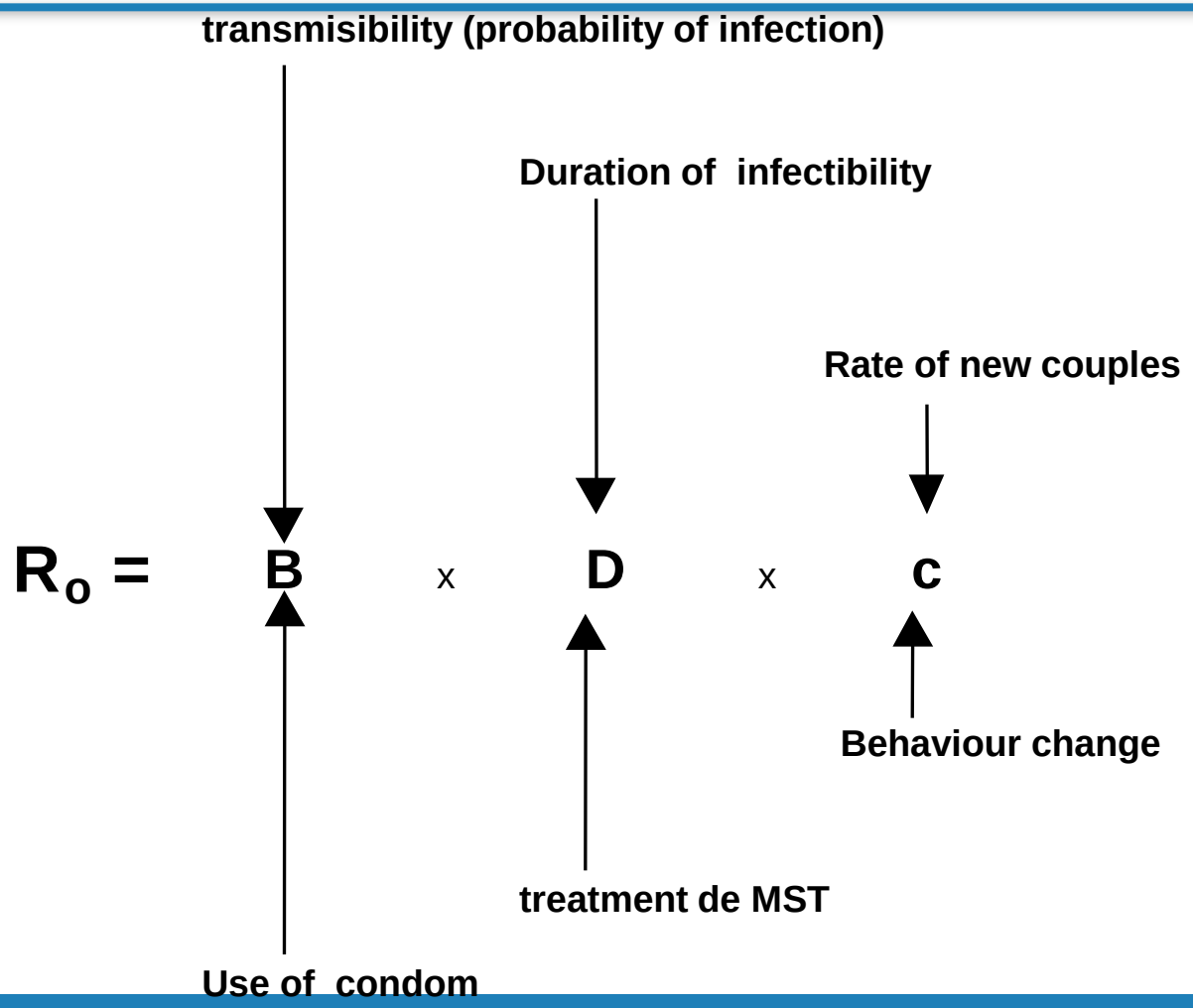
Incidence HIV infection

Incidence AIDS deaths

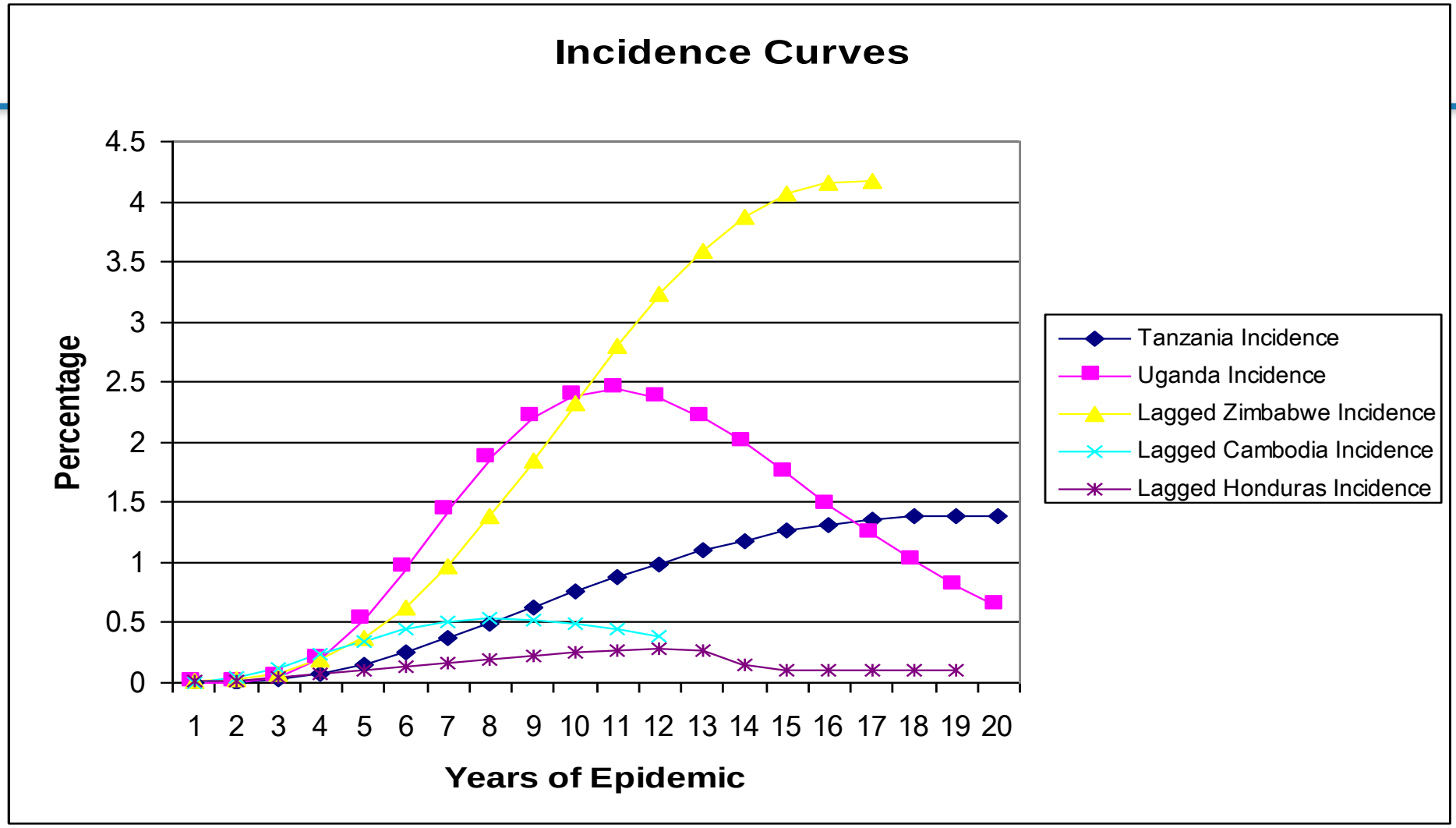
Interested in current incidence – but even if avalidated test available would require an order of magnitude increase in sample sizes.

World Health Organization

Dinamics of epiemic dissemination: Basic rate of reproduction of and STI (R_0)

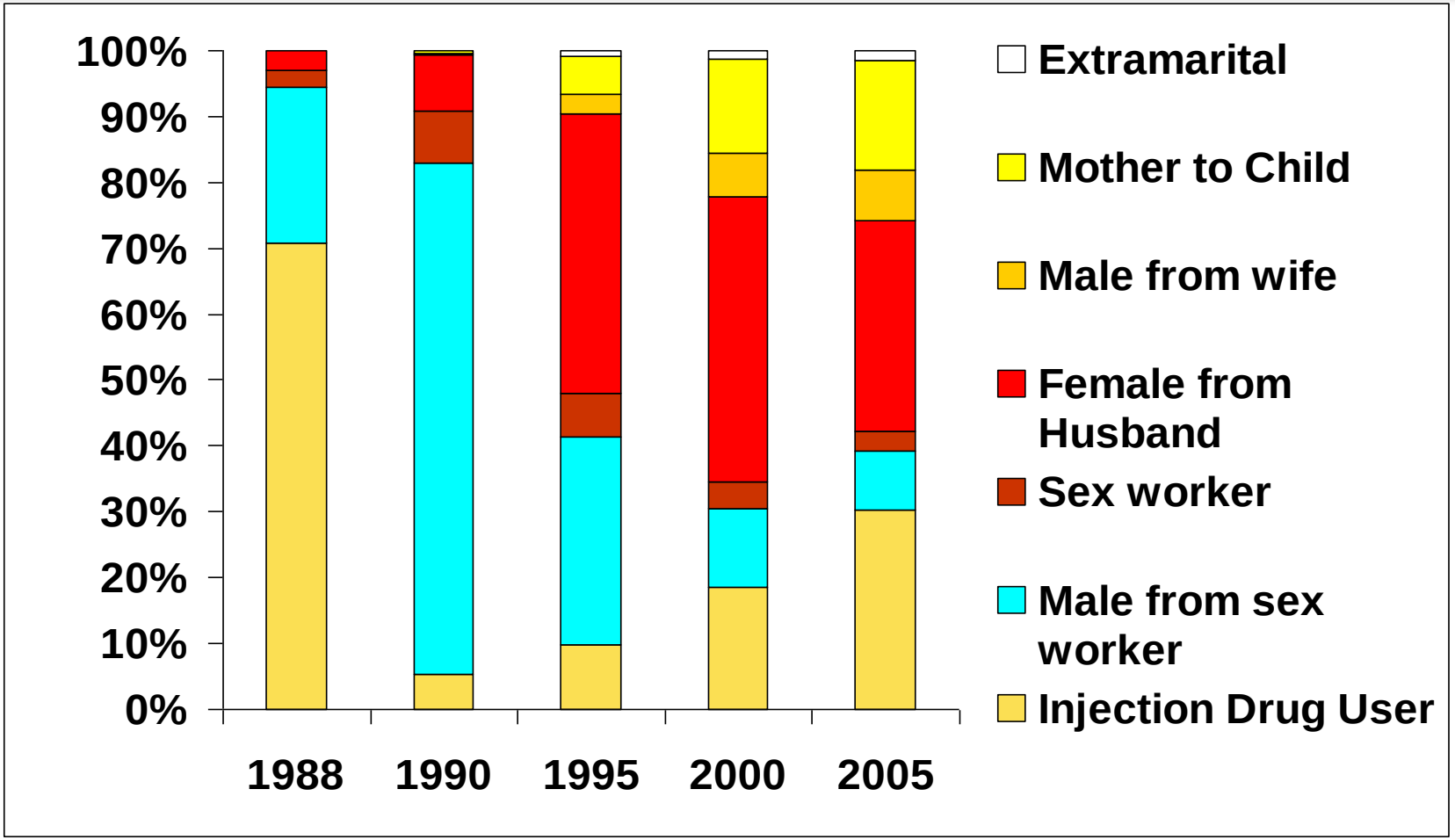


World Health Organization



World Health Organization

Thailand: changes of modes of tranmission



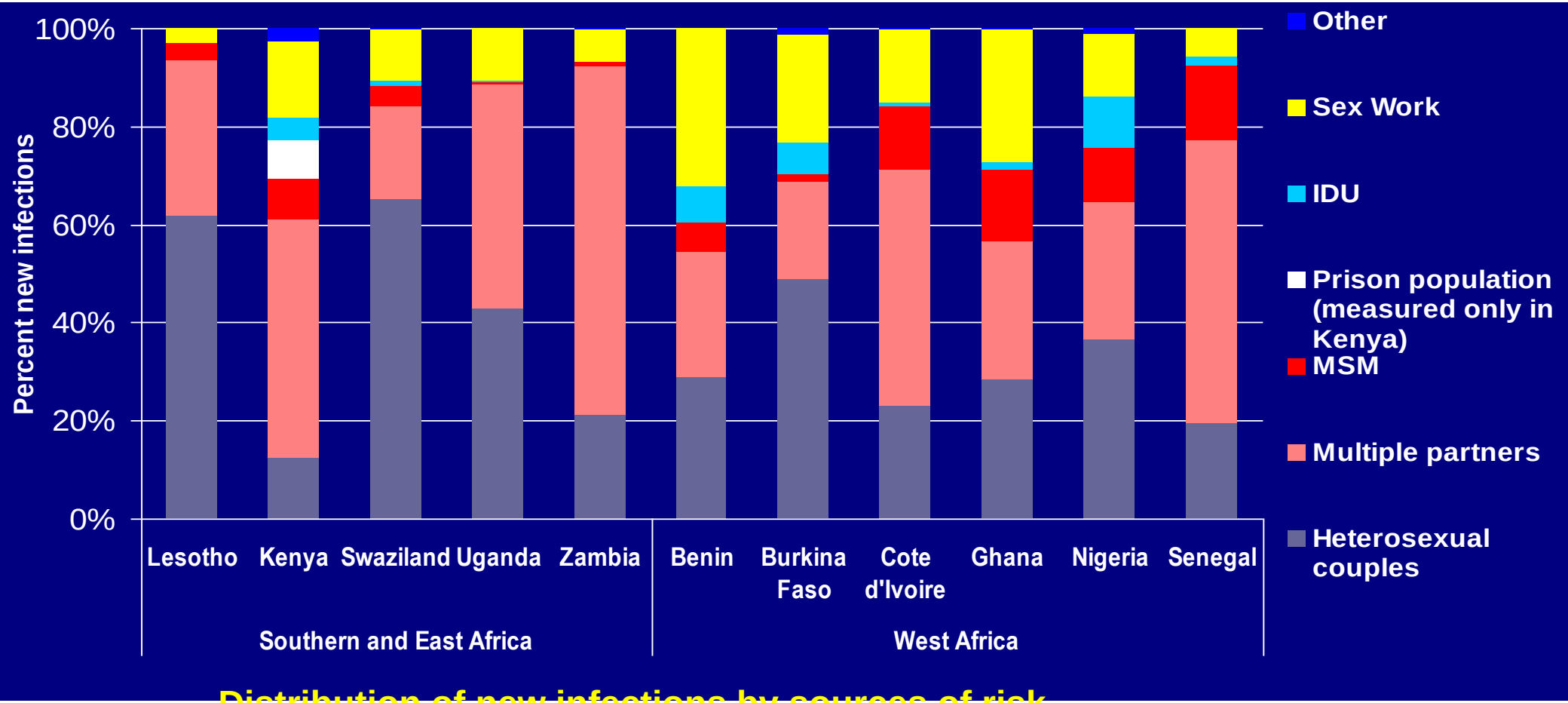
World Health Organization

Number of infections per year and mode of , Cambodia, 1988-2004

Source: Peerapatanapokin and Brown, using Asia Epidemic Model

World Health Organization

Modes of transmission in sub-Saharan African countries

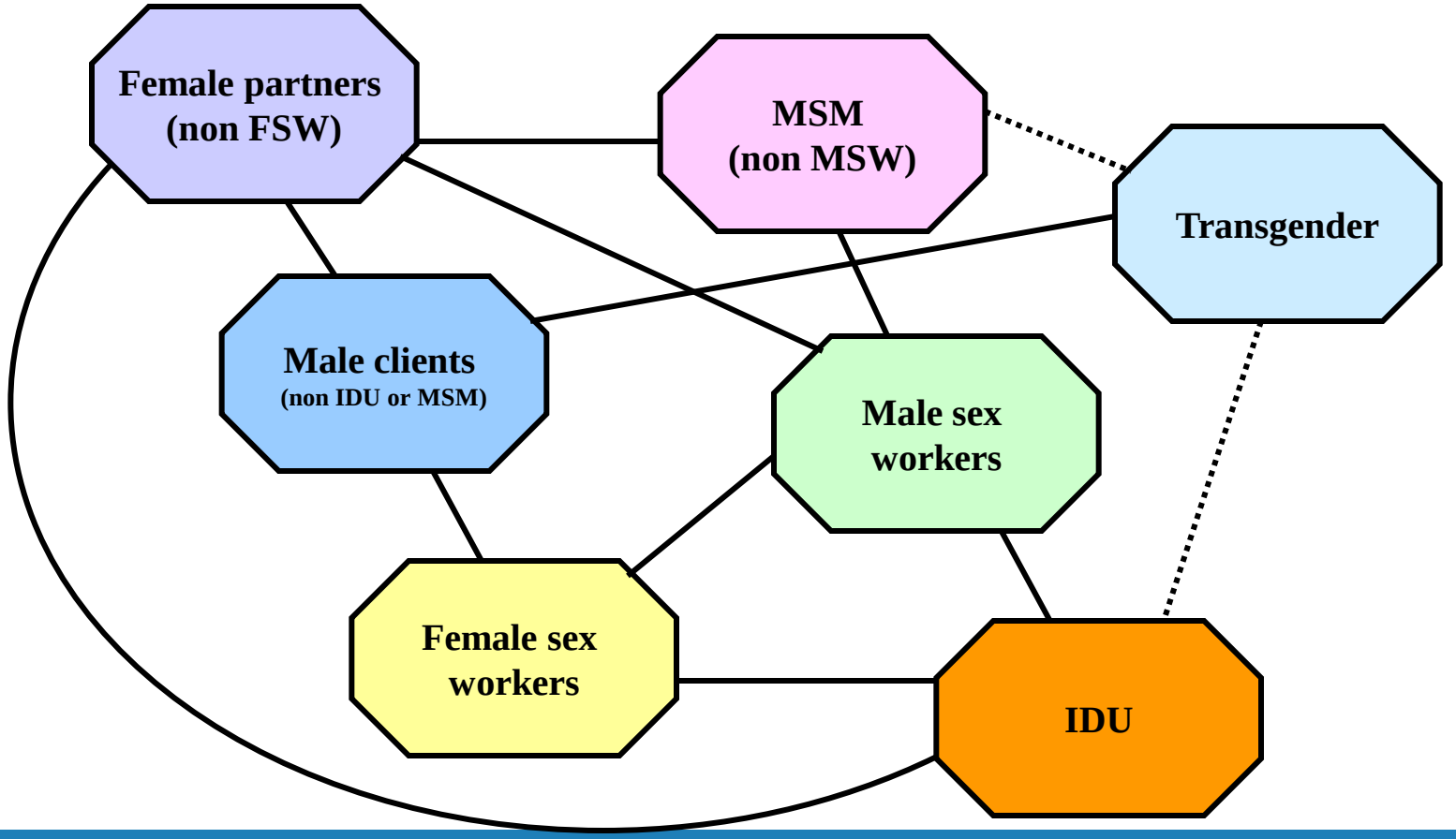


Distribution of new infections by sources of risk

Modes of transmission in South, East and West Africa, 2008–2009

World Health Organization

Sexual and drug taking networks are frequently complex and intertwined.
A "one size fits all" approach to addressing behavioral risk
rarely addresses local realities.



More common behaviors ——

Less common behaviors – – – –

"Everything" Depends upon the Viral Load

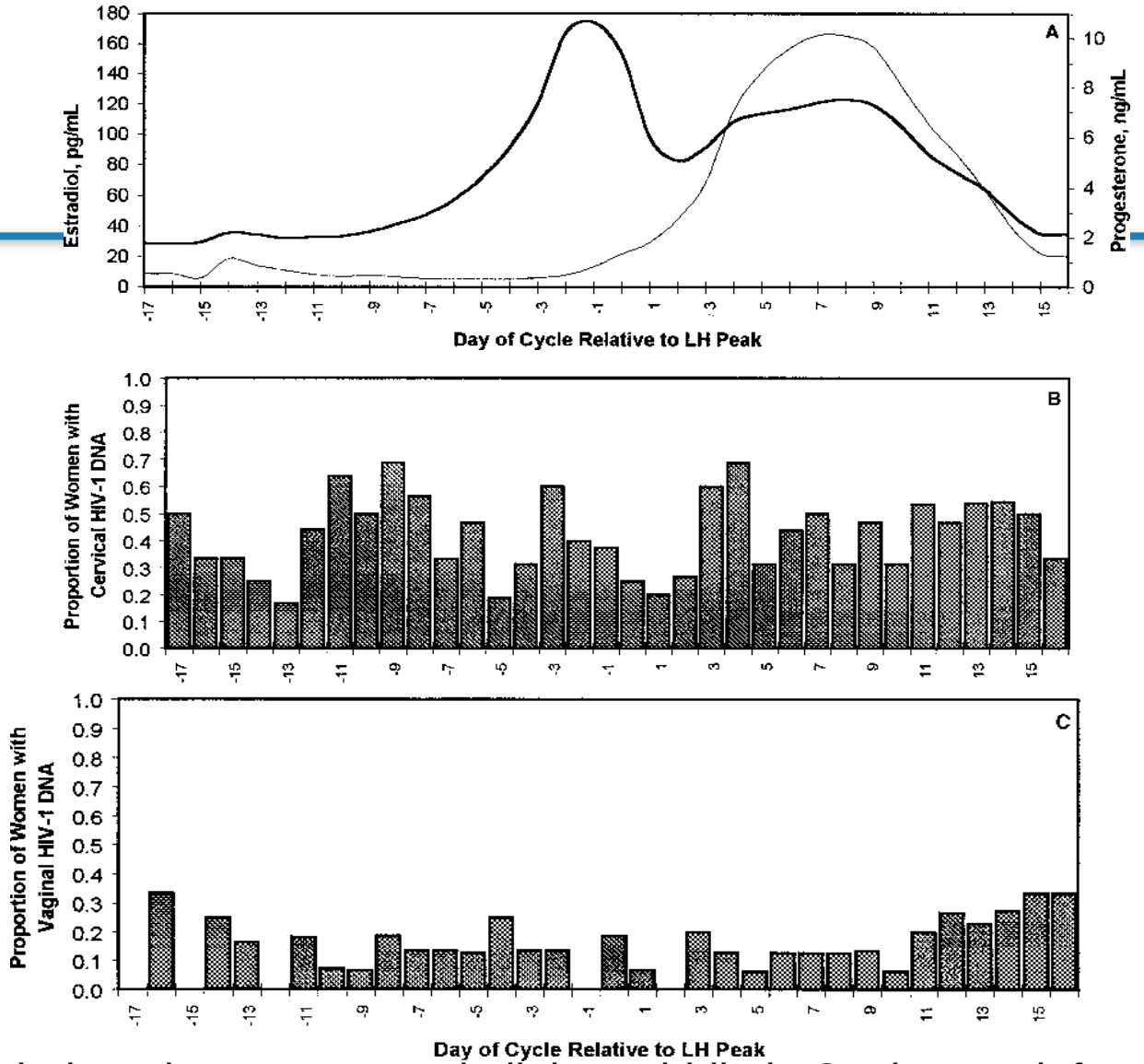
The Plasma Viral Load is Reflected in Semen and Cervico-vaginal Secretions

- Each 1-unit increase in plasma RNA led to 5.6 increase in odds of cervical and 3.9 of vaginal shedding

- If you follow women with serial cervical and vaginal sampling for HIV, 4-100% of cervical samples, and 0-71% of vaginal samples, will be positive.

Mostad et al.

World Health Organization



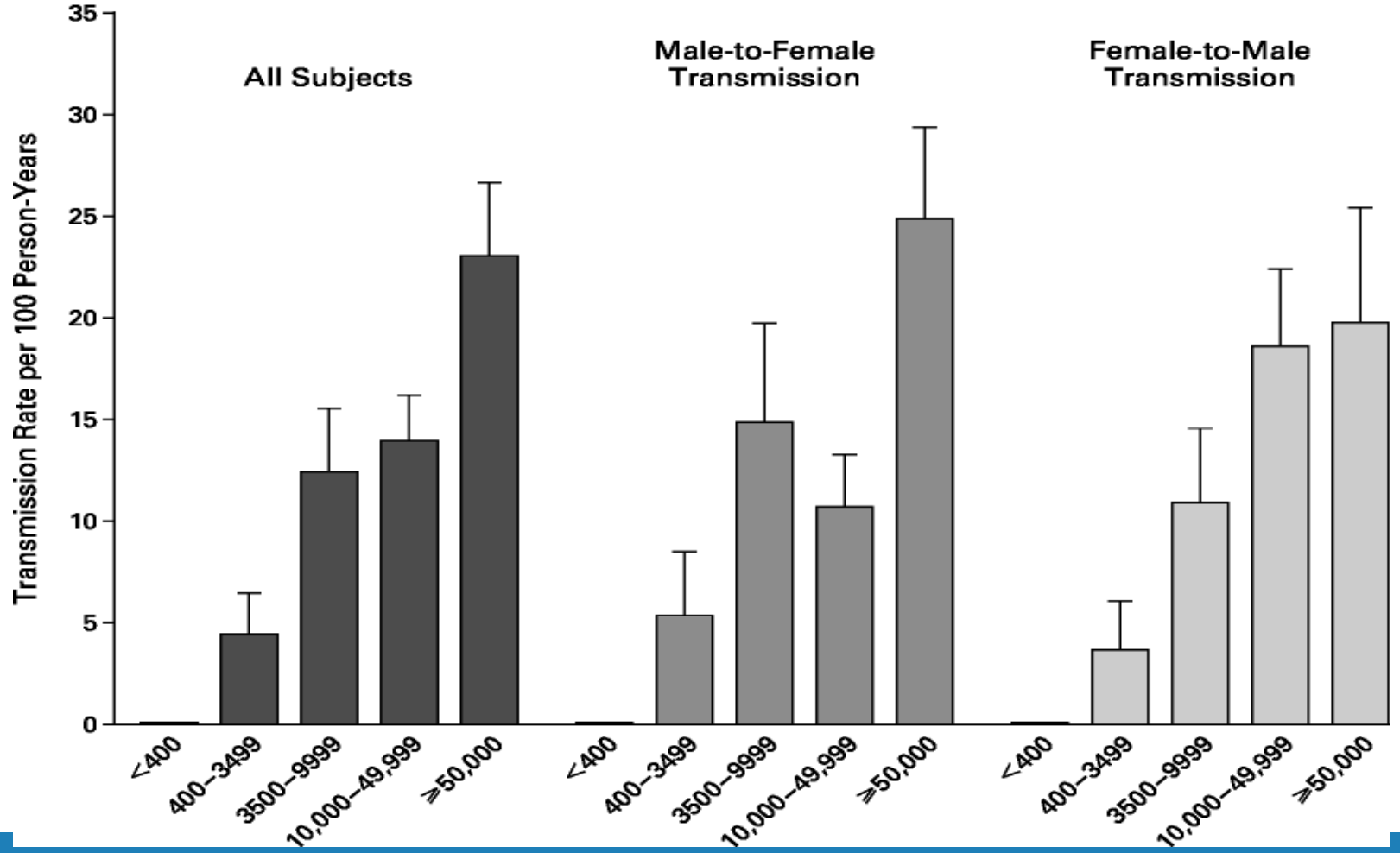
207/450 samples (46%)

74/449 (16% of samples)

Top—estradiol in dark and progesterone in light. Middle is CX (DNA—infected cells) and lower vaginal. (same)

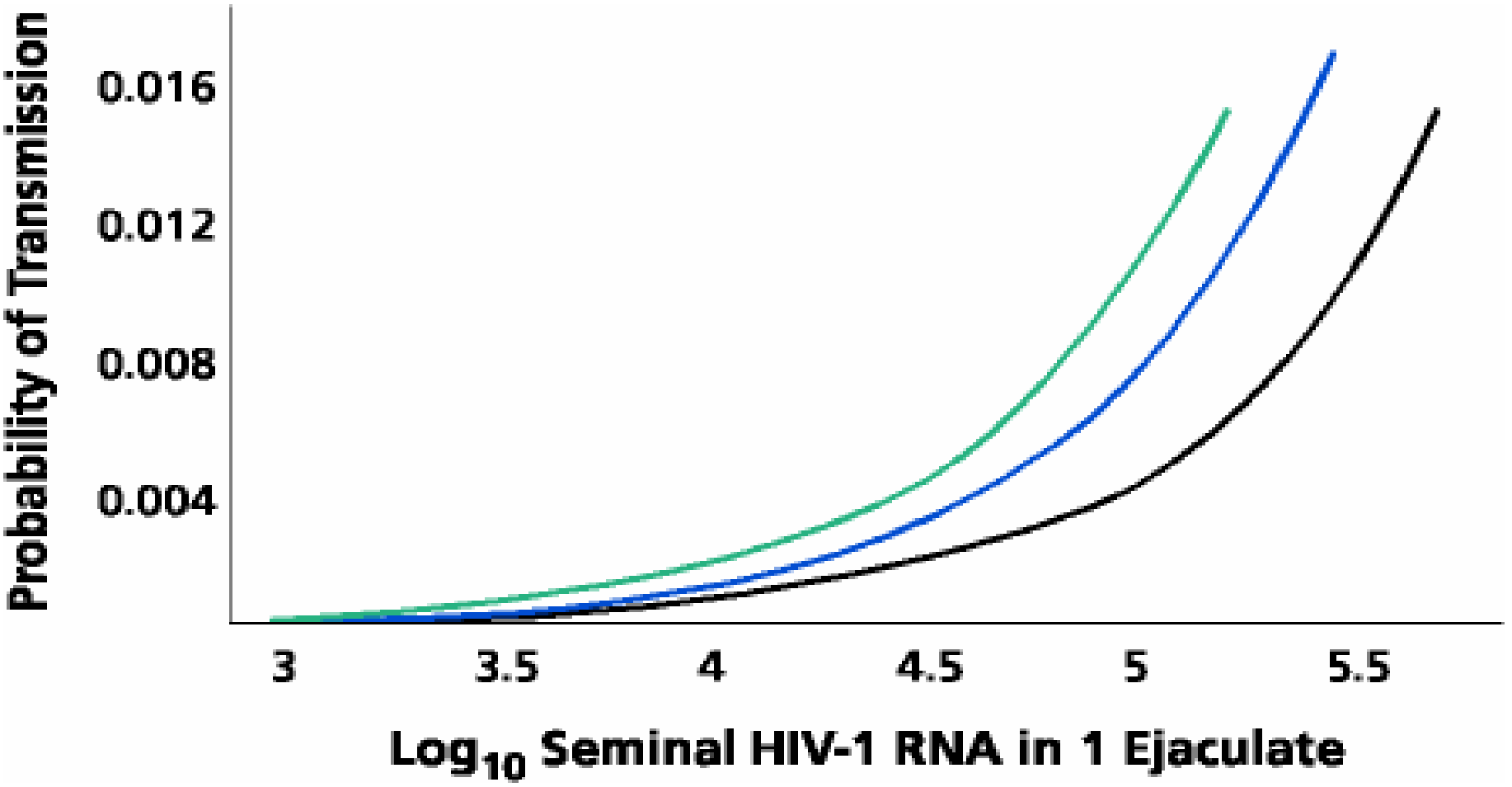
Mostad SB et al. J Infect Dis 1998;178:983

Likelihood of Transmission, by Viral Load



Quinn T et al. N Engl J Med 2000;342:921

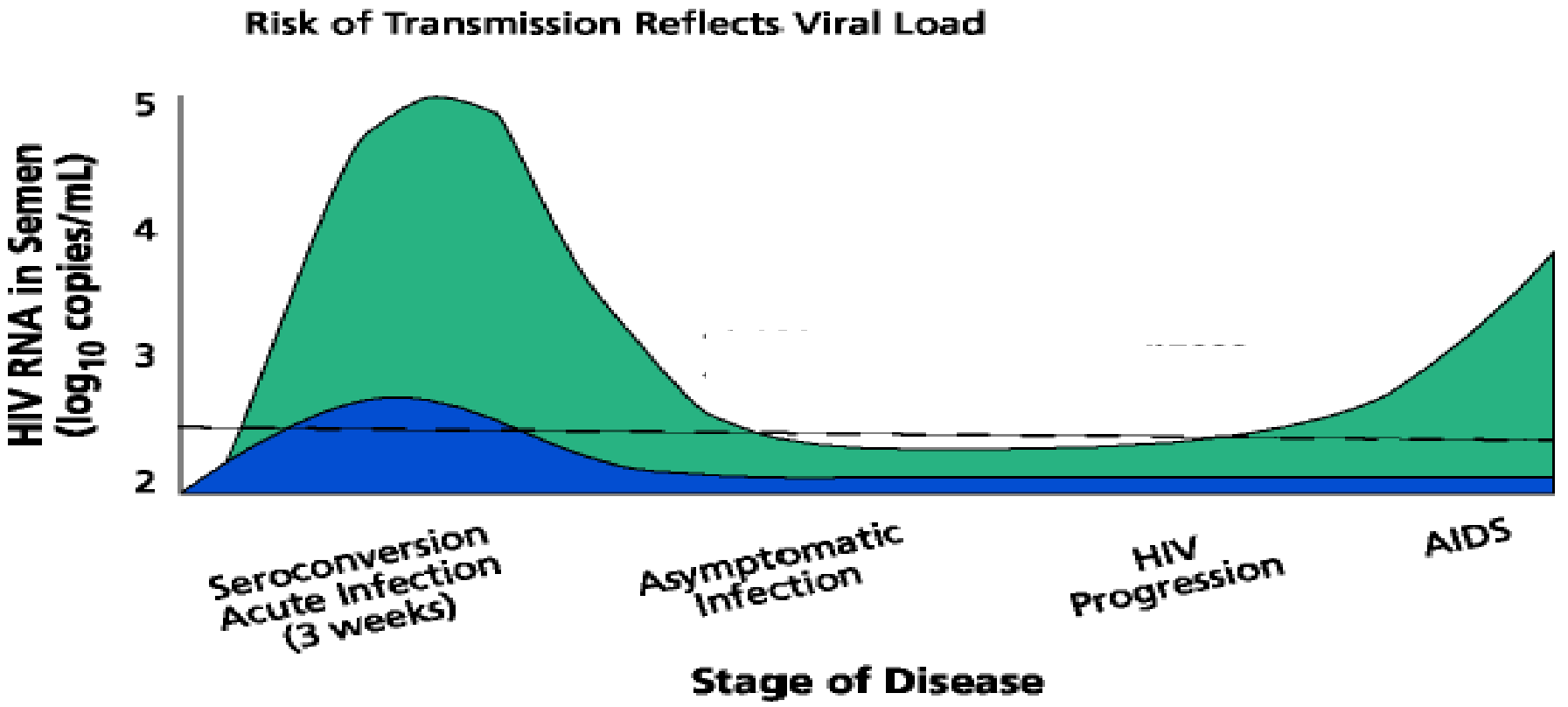
Probability of HIV Transmission, by Titer of HIV in Ejaculate and Quantity of CCR5 Receptors



Chakraborty et al. AIDS 2001

World Health Organization

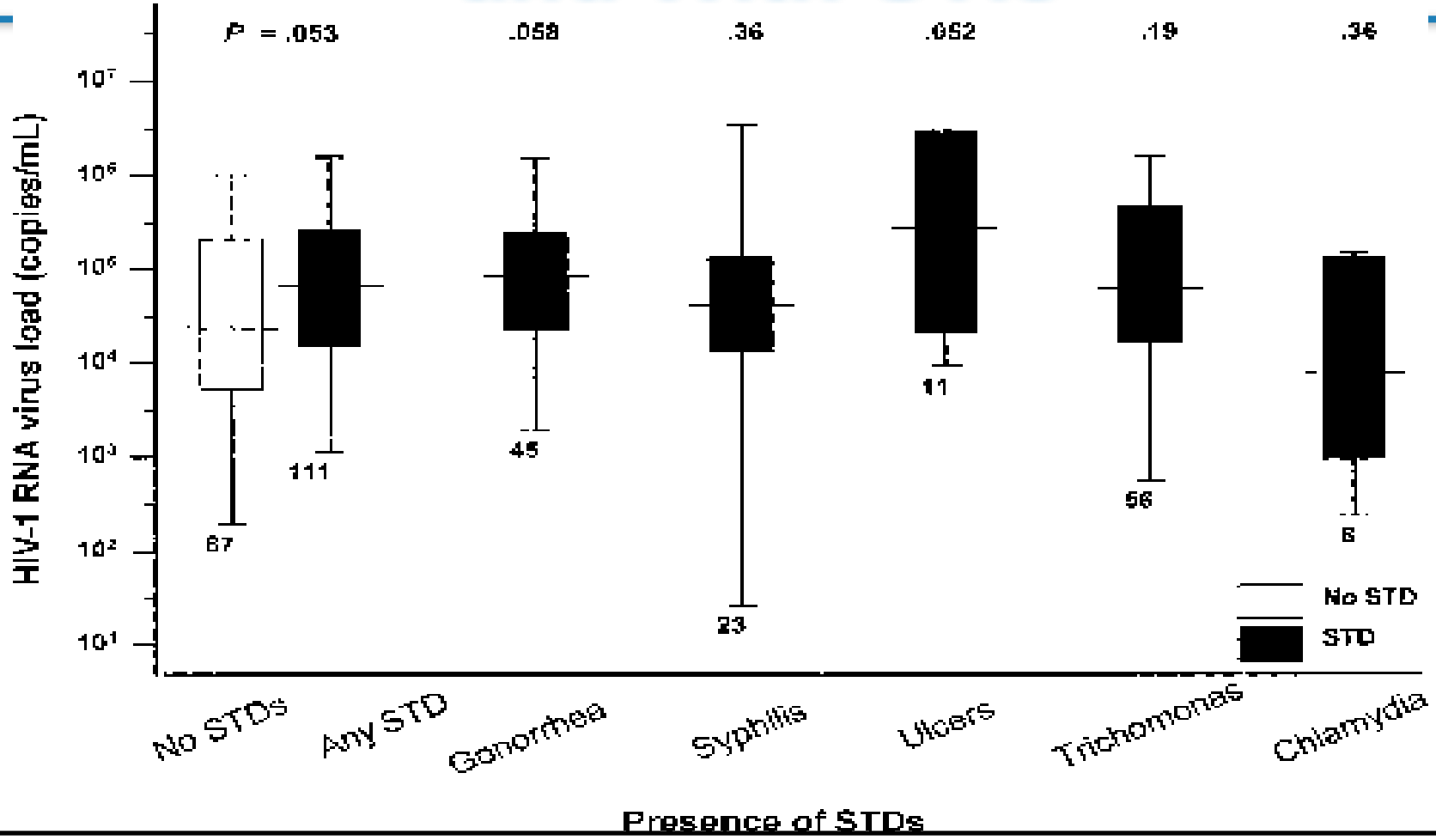
Risk of HIV Transmission by Seminal Fluid Titer and Disease Stage



Cohen M. Topics in HIV Medicine, 2004;12:104.

World Health Organization

Plasma Viral Load, Women without and With STIs



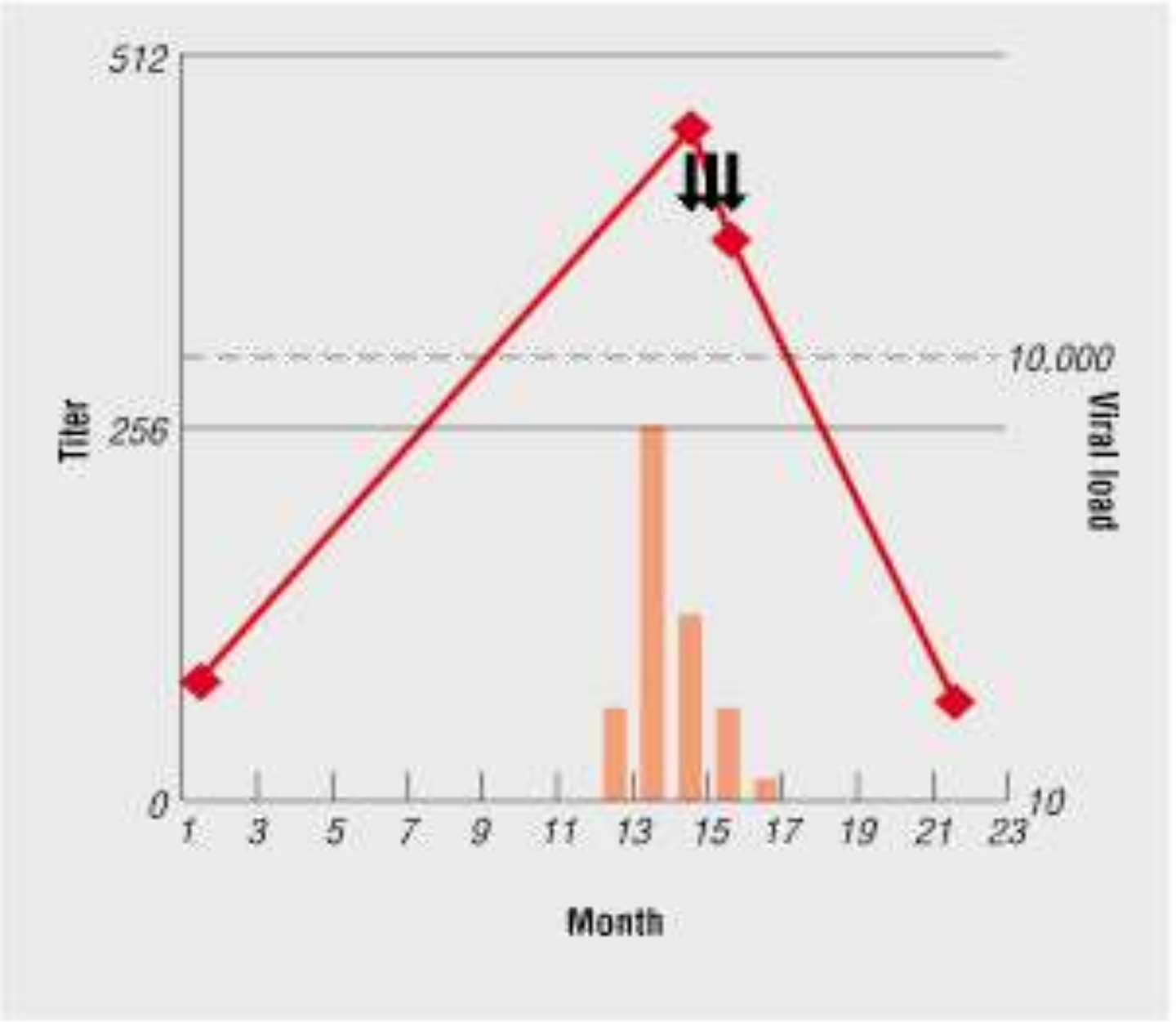
After adjustment for CD4, women with an STI have 2.5-fold increase in HIV load

Nkengasong JN et al. J Infect Dis 2001;183:1405.

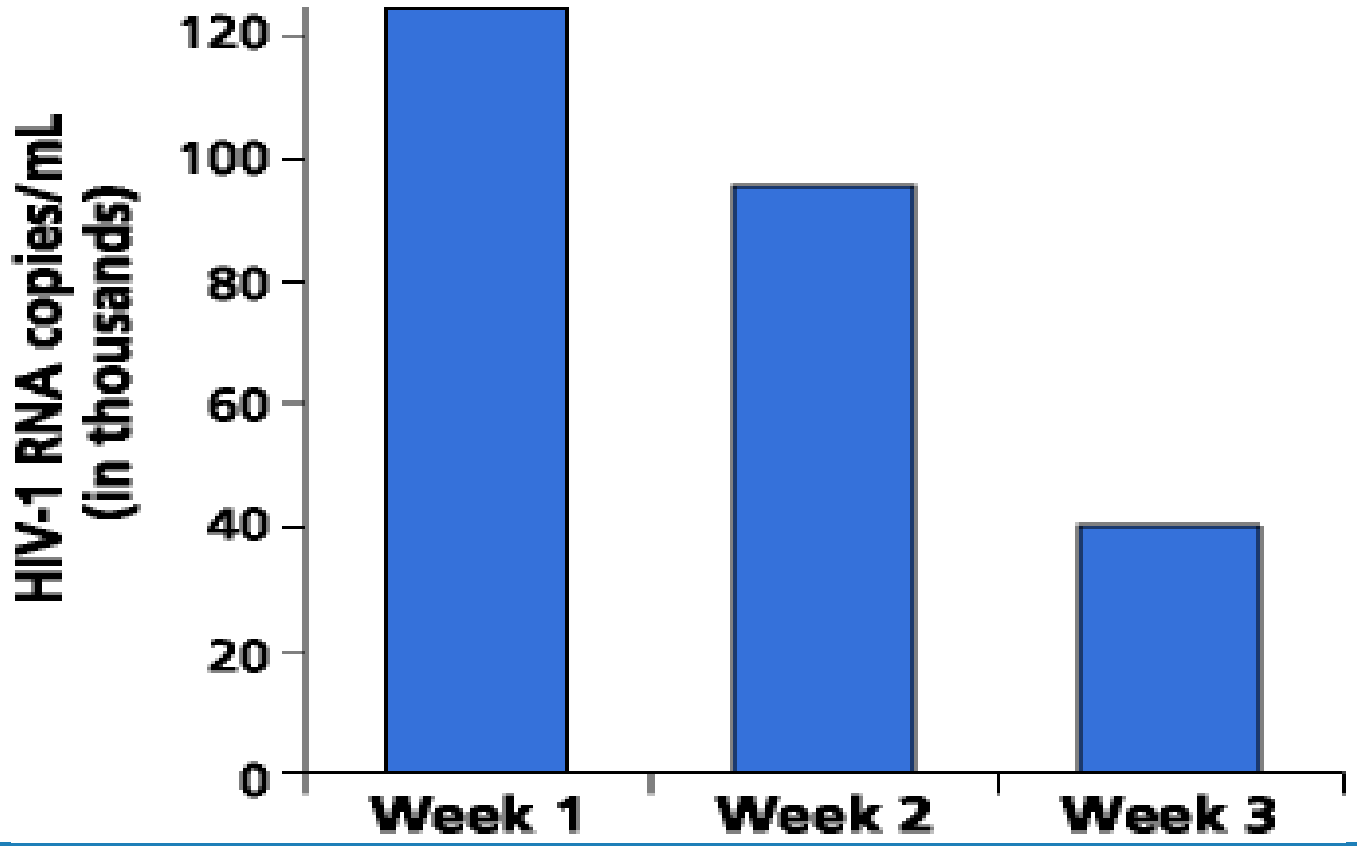
World Health Organization

Figure 1. Increases in HIV viral load with syphilis infection and decreases with syphilis treatment.

Adapted from Buchacz K, Patel P, Taylor M, et al. Syphilis infection increases HIV viral load in HIV-infected men, National HIV Prevention Conference, July 27-30, 2003, Atlanta.

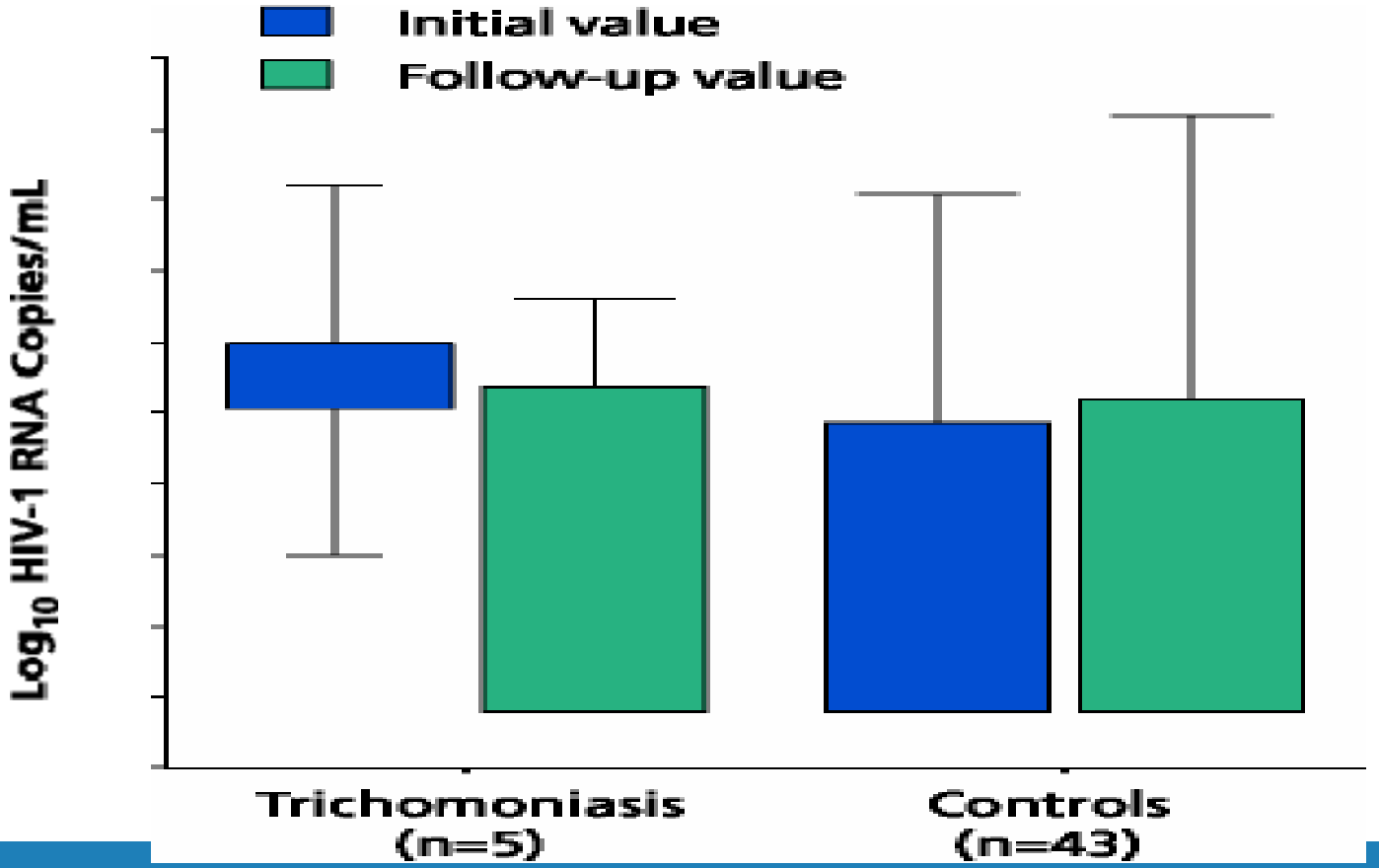


Effect on Titer in Seminal Fluid of 86 Men with Gonorrhea Receiving a Single Dose of Ceftriaxone



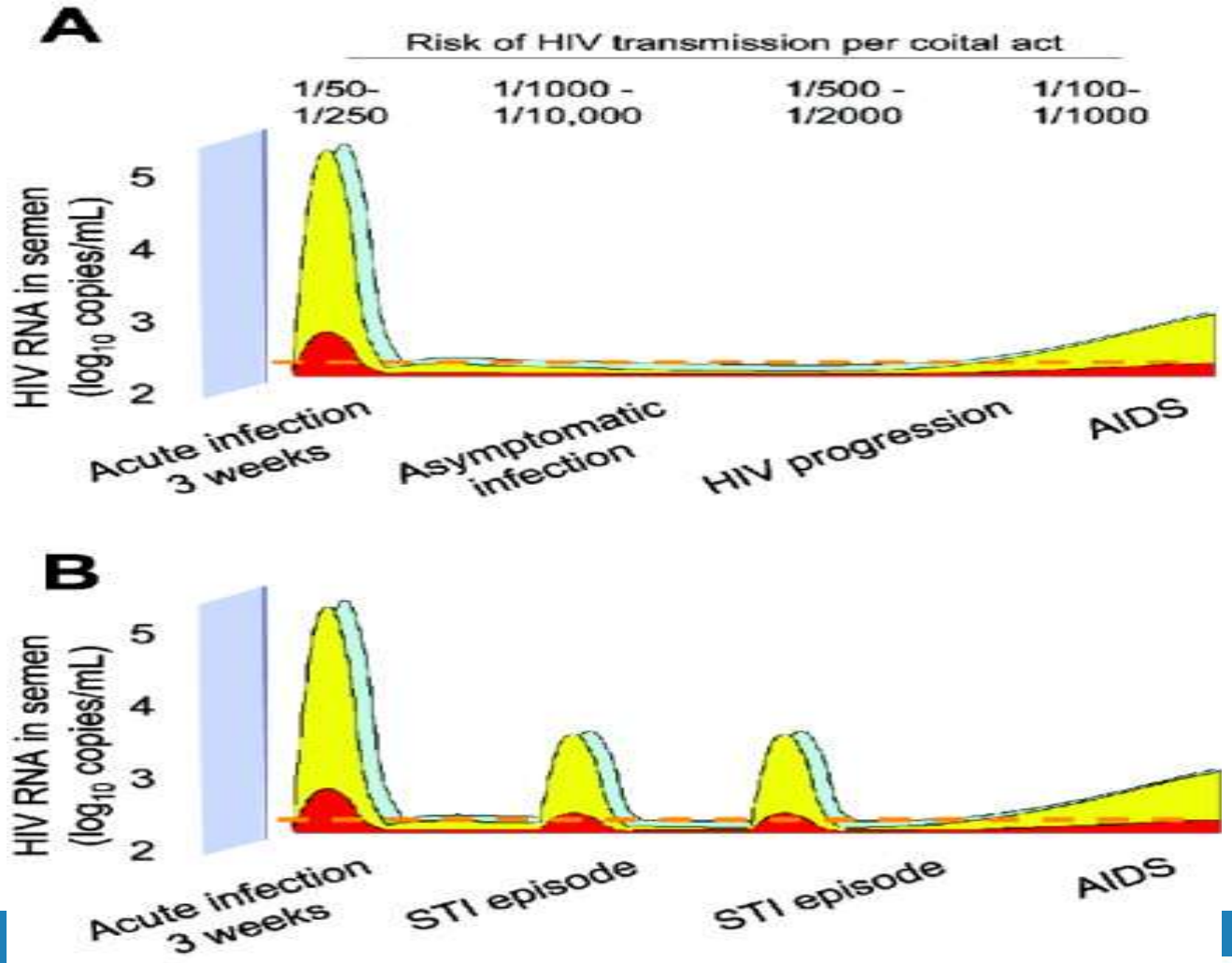
World Health Organization

Effect on Titer in Genital Tract Secretions Following Treatment for Trichomoniasis, vs. Controls



Price et al. Sex Transm Dis 2003

Transmission of HIV and How STIs Can Increase It

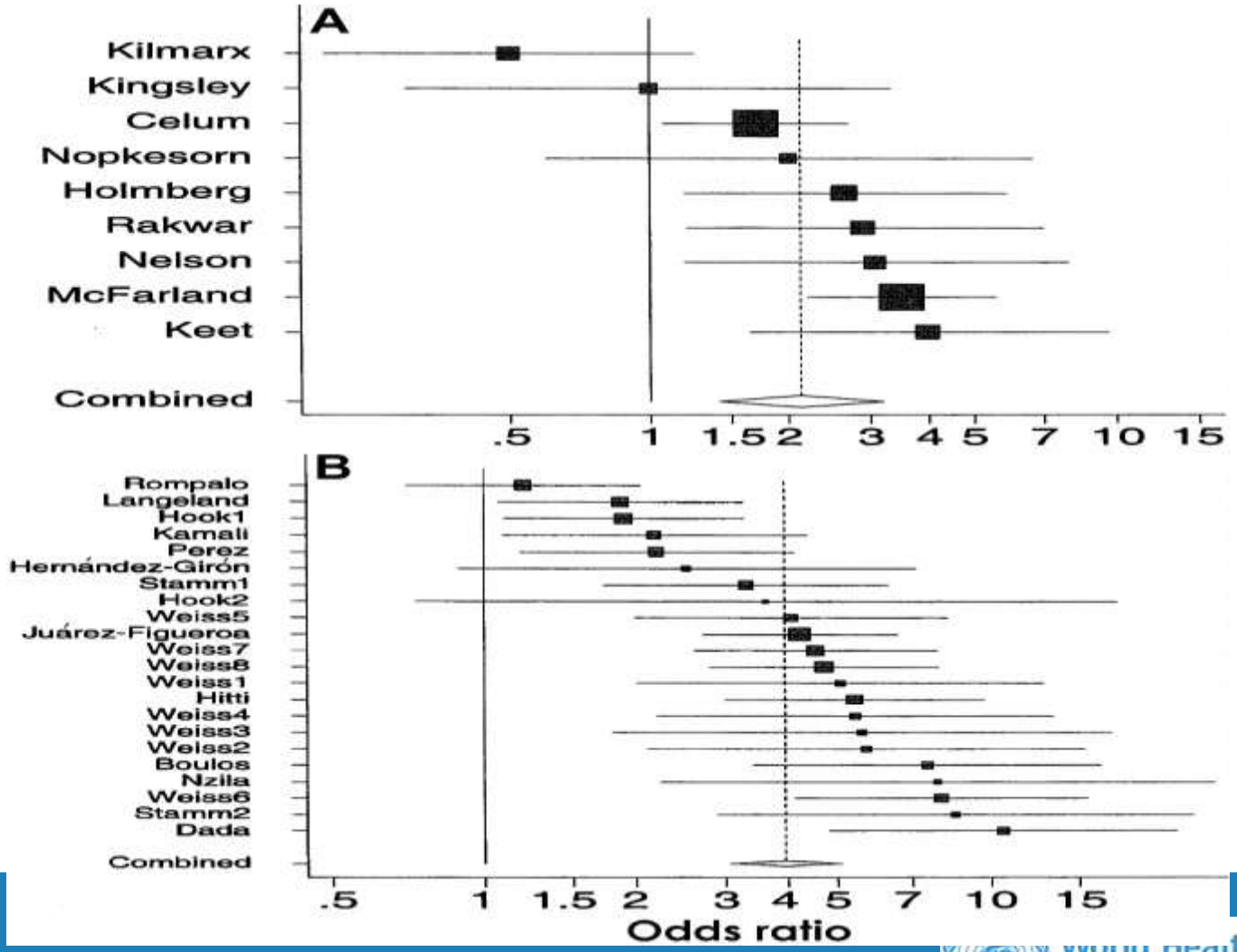


Cohen MS and Pilcher CD. J Infect Dis 2005;191:1391

World Health Organization

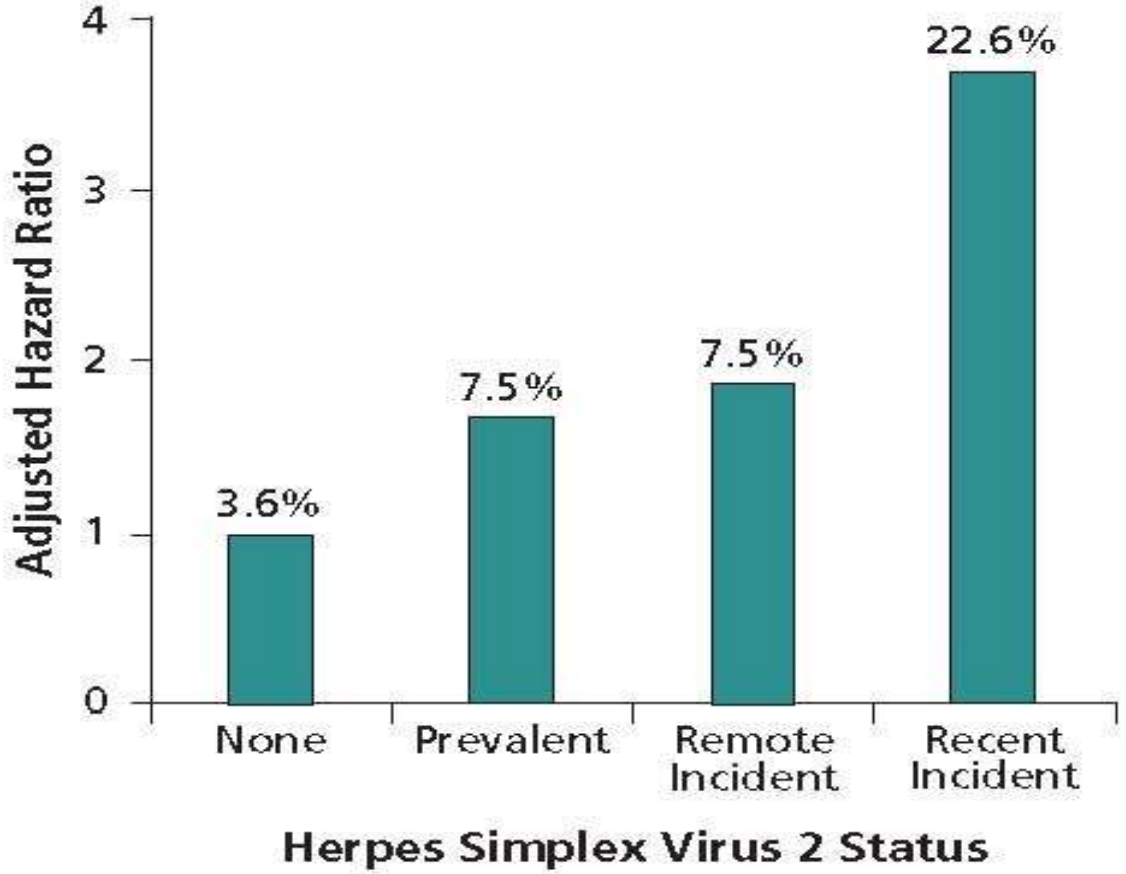
Meta-analysis of the Association of Genital Herpes with HIV Infection

Case-control and cross-sectional studies — Cohort studies



Wald A and Link K. J Infect Dis 2002;188:45.

Risk of HIV Acquisition, by HSV-2 Infection Status

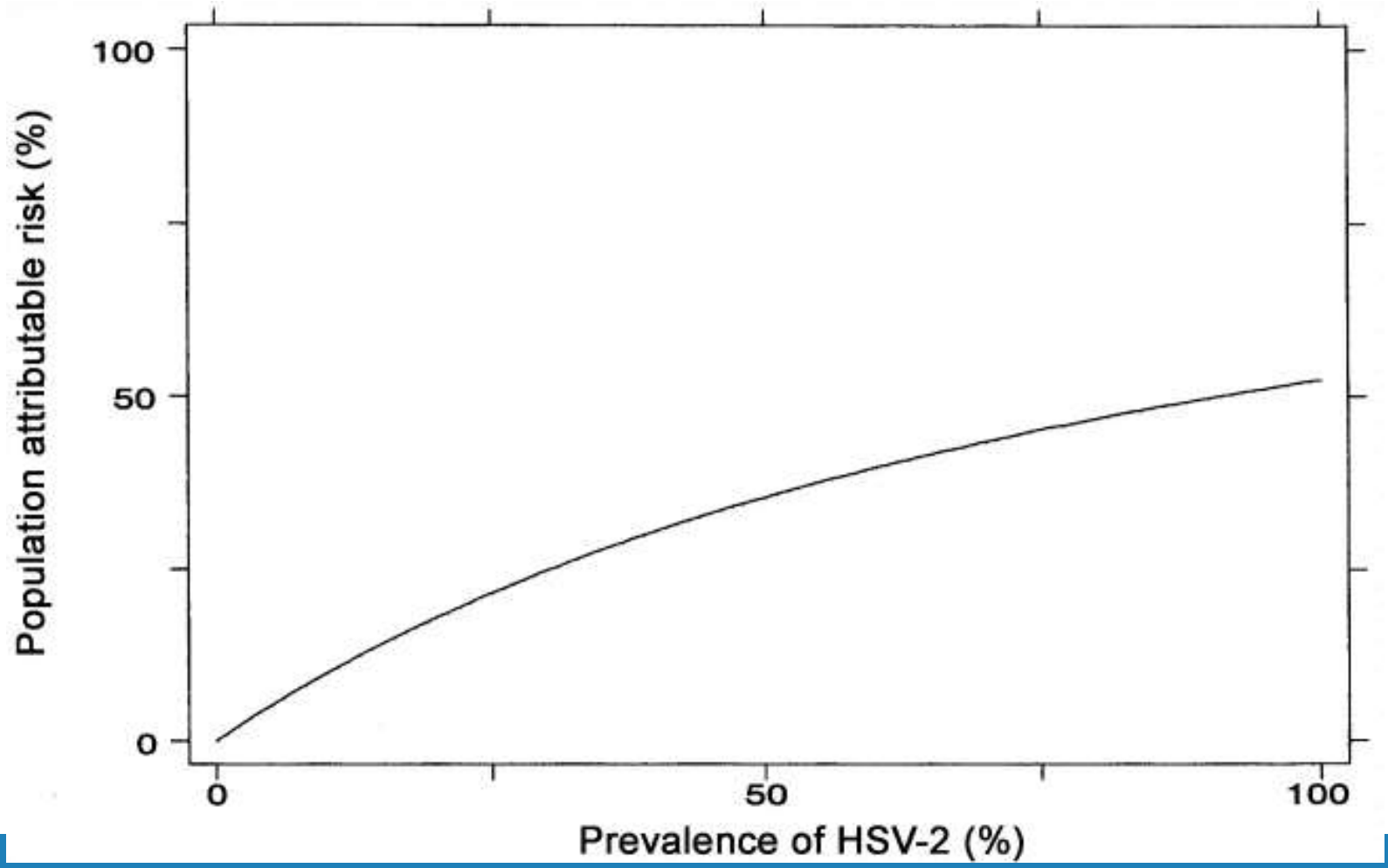


Percentage is incidence per 100 person-years

Reynolds SJ, et al. J Infect Dis 2003187:1513

World Health Organization

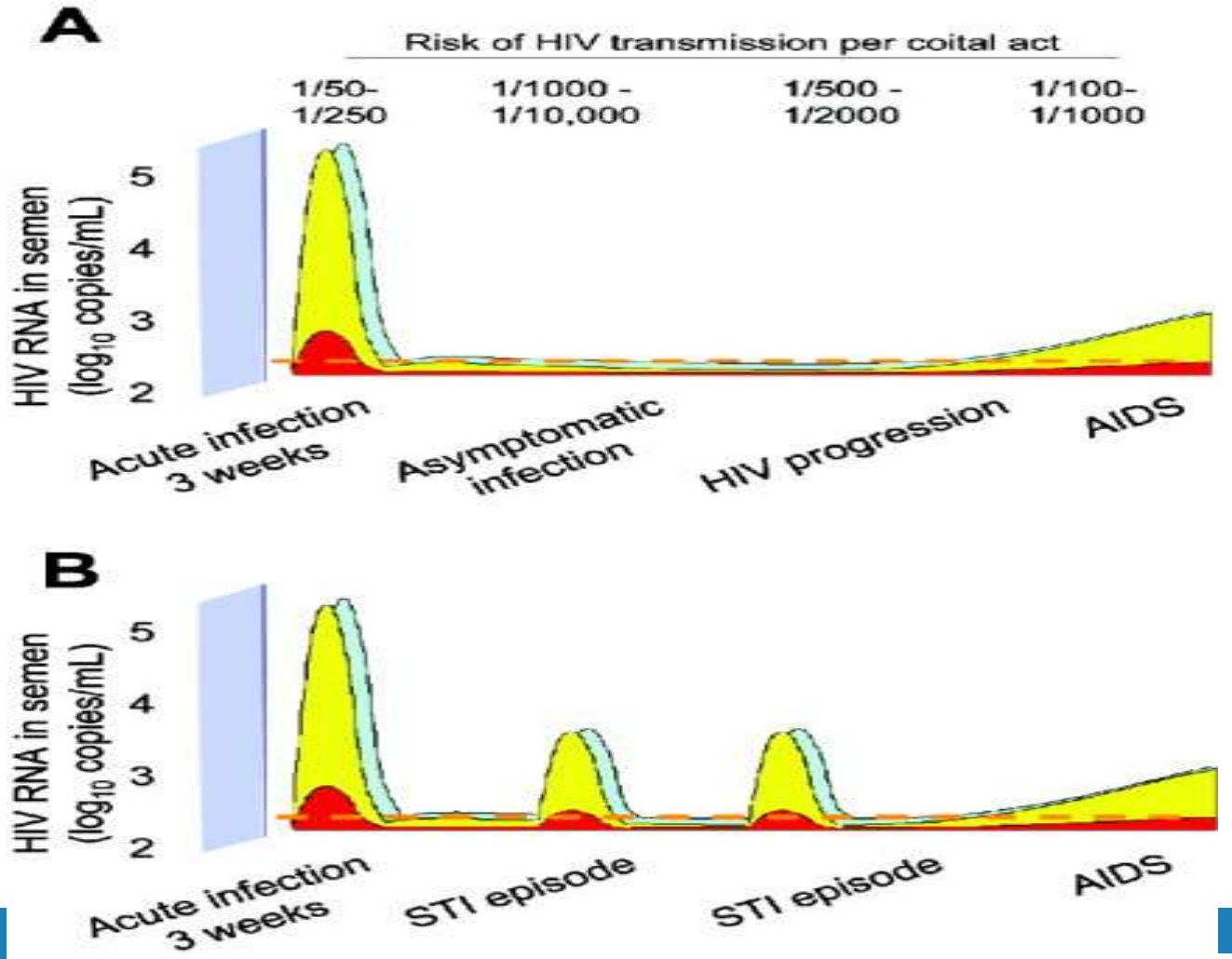
Modelled Attributable Risk of HIV Infection to Genital Herpes



Wald A and Link K. J Infect Dis 2002;188:45.

World Health Organization

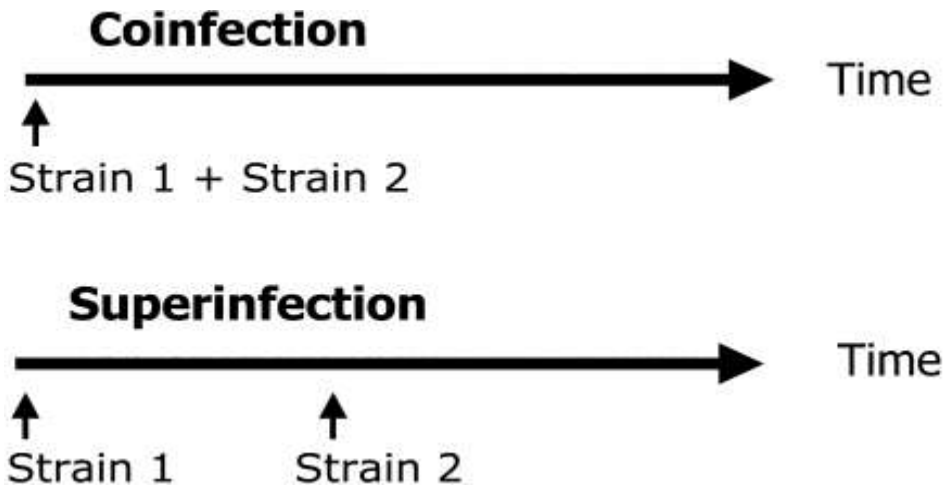
Transmission of HIV and How STIs Can Increase It



World Health Organization

Do People with HIV Infection Commonly Become Infected with New Strains of HIV?
"Superinfection"

Coinfection vs. Superinfection



Smith D et al. J Infect Dis 2005;192:438

The Number of Published Cases of Superinfection is Small

- Data are conflicting on how common superinfection is:
  - Technically difficult to identify new strains
  - If one determines an individual has >2 strains, how do we know if there was coinfection or superinfection?
  - Some data indicate it may occur almost as frequently as primary infection (remarkable, and bad for vaccine development) while other data indicate it is rare

So What if I Become Superinfected?

- It seems superinfection, at least temporarily, creates a new "set point" that is higher than the previous set point, coincident with a drop in CD4 cell count

- Some reports indicate a more rapid clinical progression following superinfection

Smith D et al. J Infect Dis 2005;192:438

What Do Data on Superinfection Mean for Counseling?

- 90% of HIV-infected MSM in San Francisco have heard of superinfection, and 74% indicate they have used safer sex practices because of it[1]

- It may be an effective counselling message for us to give to HIV-positive patients, but we must be honest

[1]Colfax GN et al. J AIDS 2004;36:990

Does STI Control Reduce HIV Incidence? 3 community-randomized trials

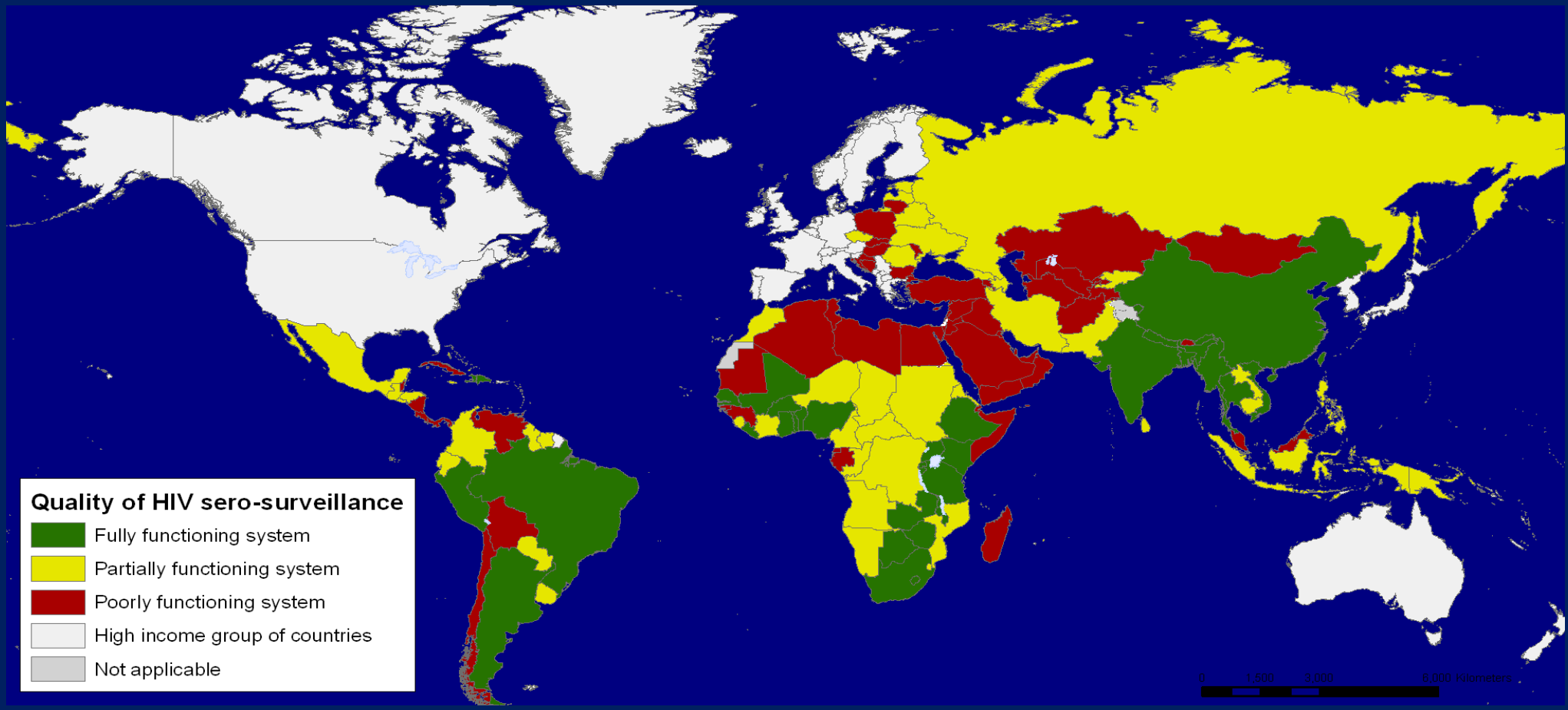
- Mwanza, Tanzania
  Grosskurth et al. Lancet 1995;346:530
- Rakai, Uganda
  - *Wawer et al. Lancet 1999:353:525*
- Masaka, Uganda
  - *Kamali et al. Lancet 2003;361;645*

Outline

- HIV transmission factors
- HIV global epidemiological overview
- Some data in the national response
- What are the current issues

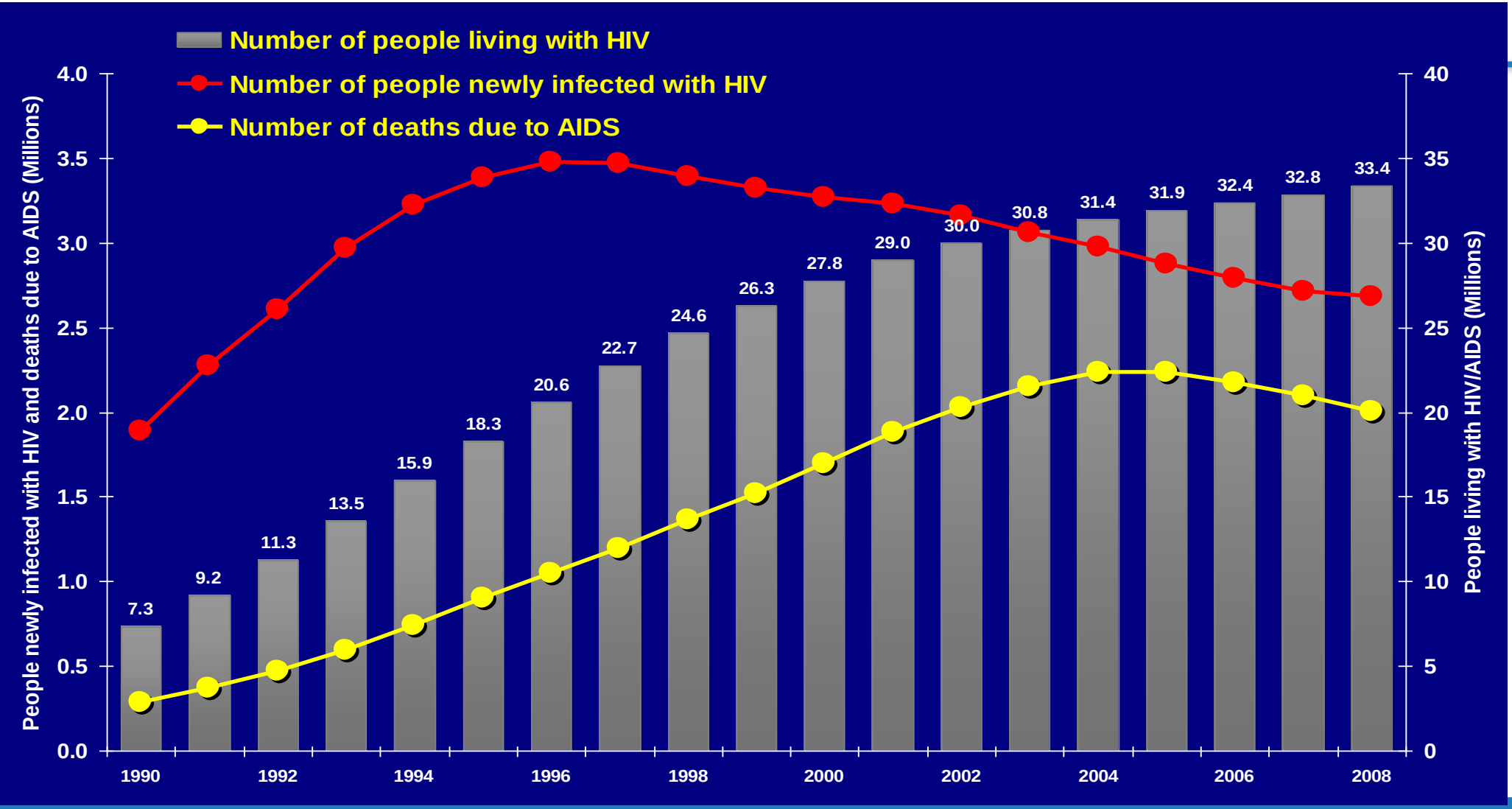
Surveillance: progress and gaps

Quality of HIV surveillance systems, 2009, WHO/UNAIDS



World Health Organization

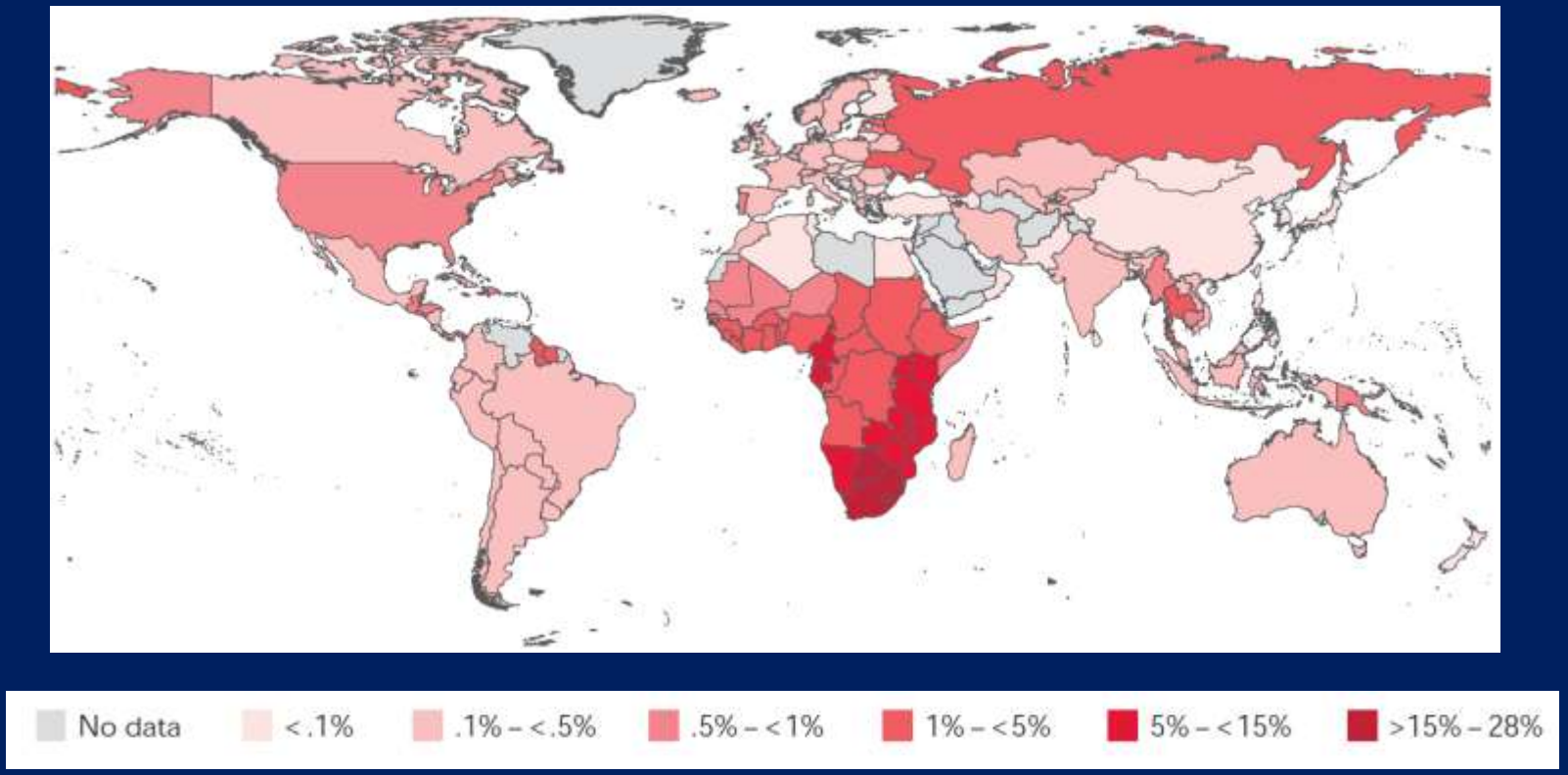
Thirty years into the epidemic



UNAIDS/WHO Epi update, 2009

World Health Organization

Global prevalence of HIV, 2010

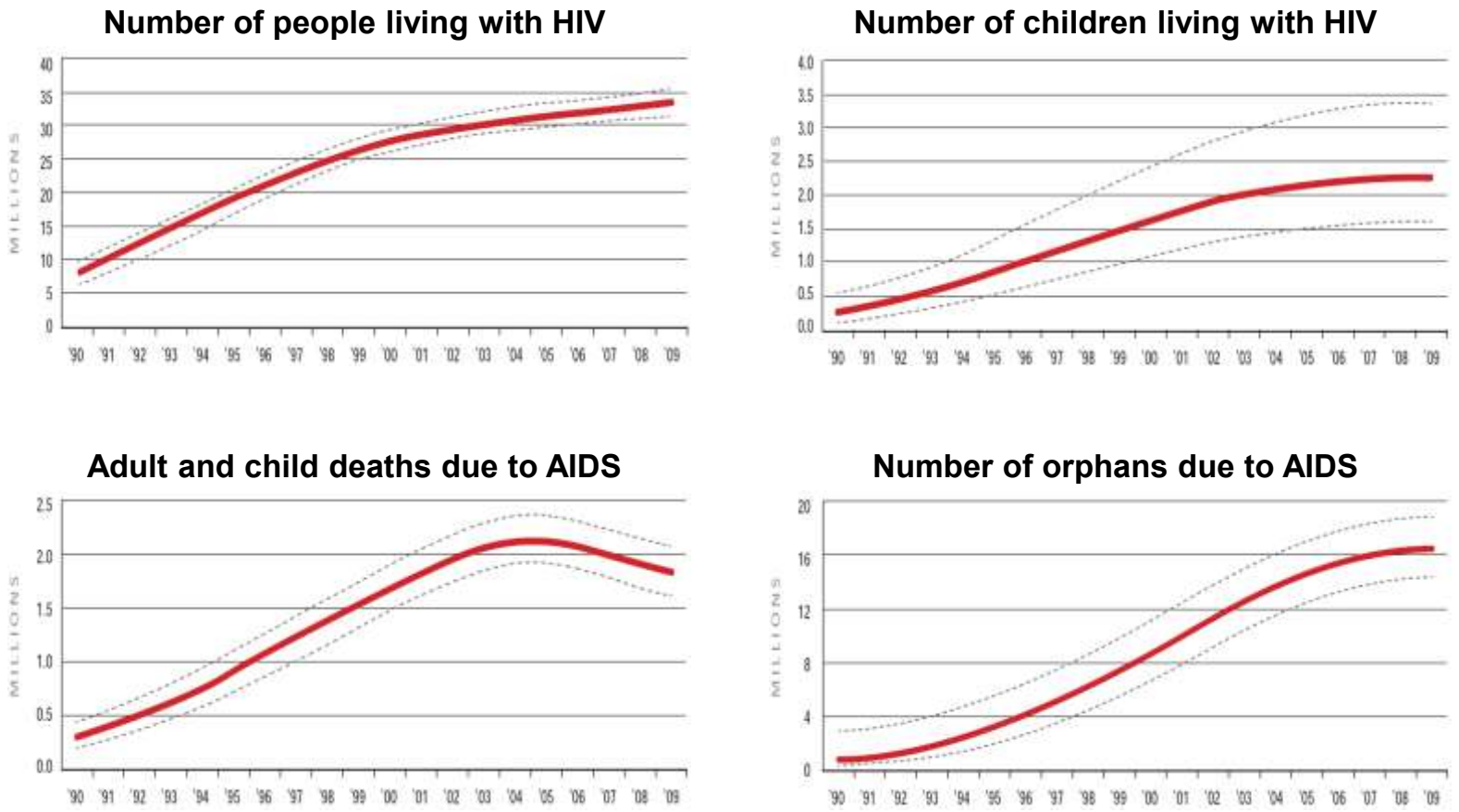


Source: UNAIDS.

World Health Organization

Figure 2.5

Global HIV trends, 1990 to 2009



Dotted lines represent ranges, solid lines represent the best estimate.

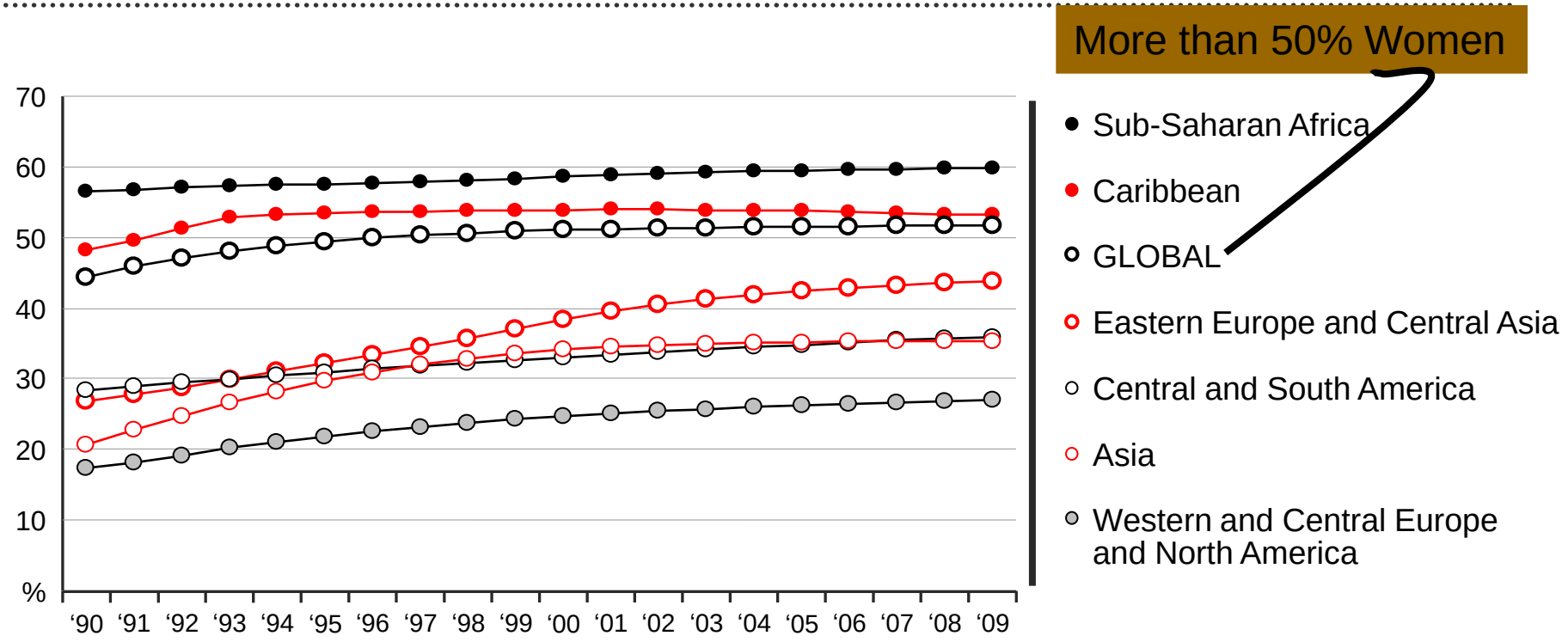
Source: UNAIDS.

World Health Organization

Figure 2.6

Trends in women living with HIV

Proportion of people 15 years and older living with HIV who are women, 1990–2009.

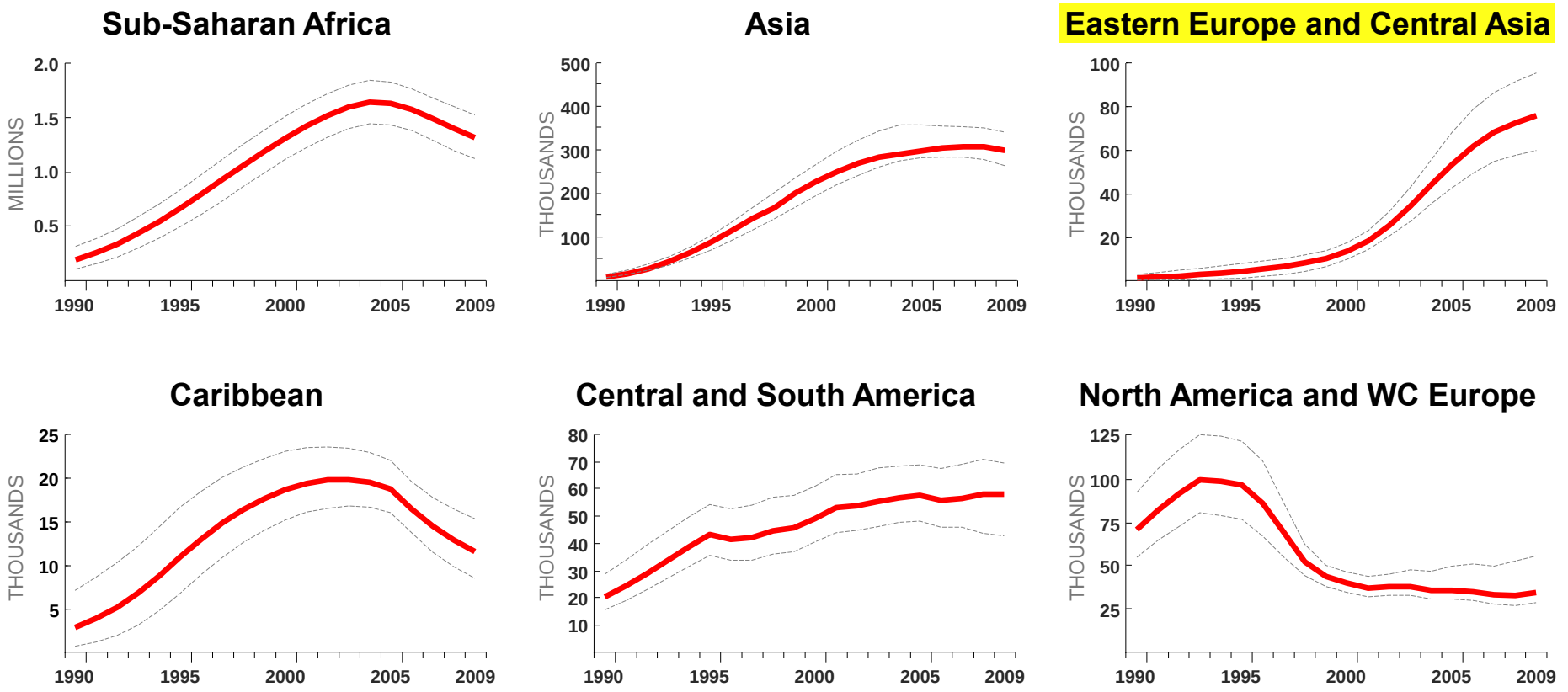


Source: UNAIDS.

World Health Organization

Figure 2.3

AIDS-related deaths by region, 1990-2009



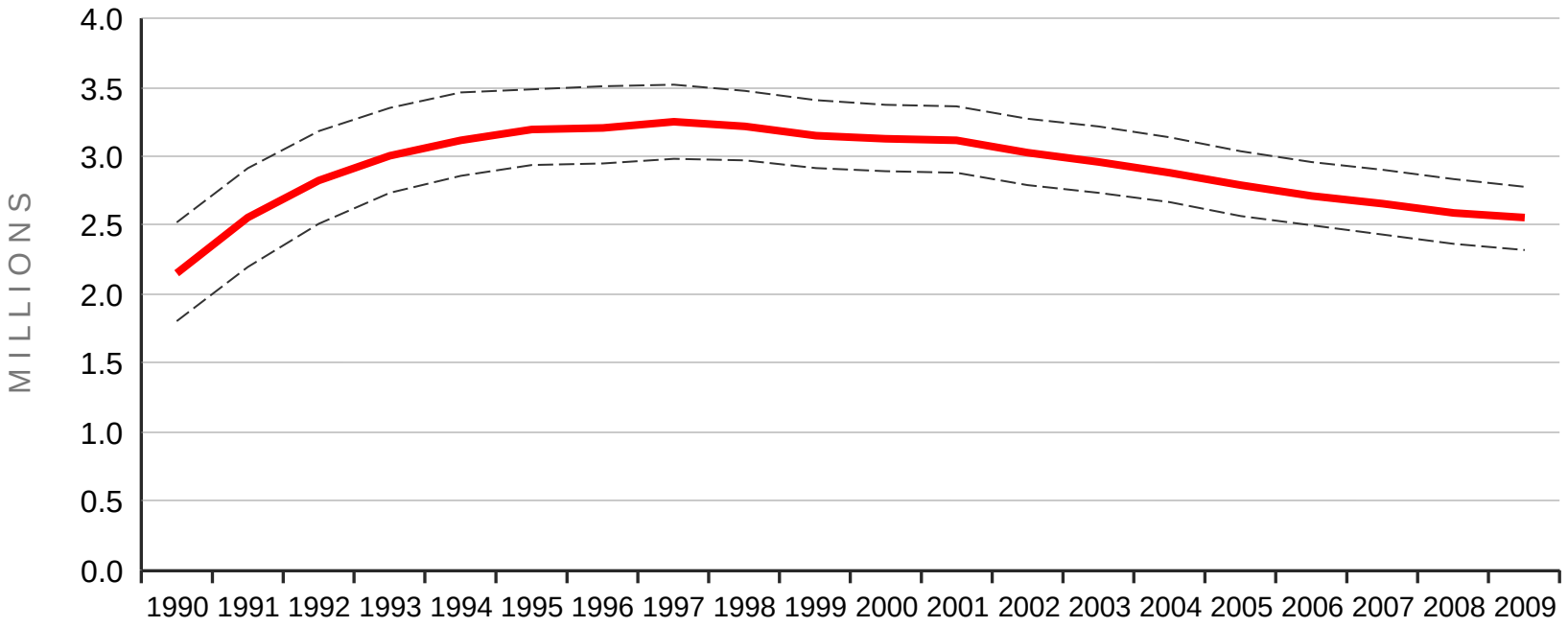
Dotted lines represent ranges, solid lines represent the best estimate.

Source: UNAIDS.

World Health Organization

Figure 2.1

Number of people newly infected with HIV

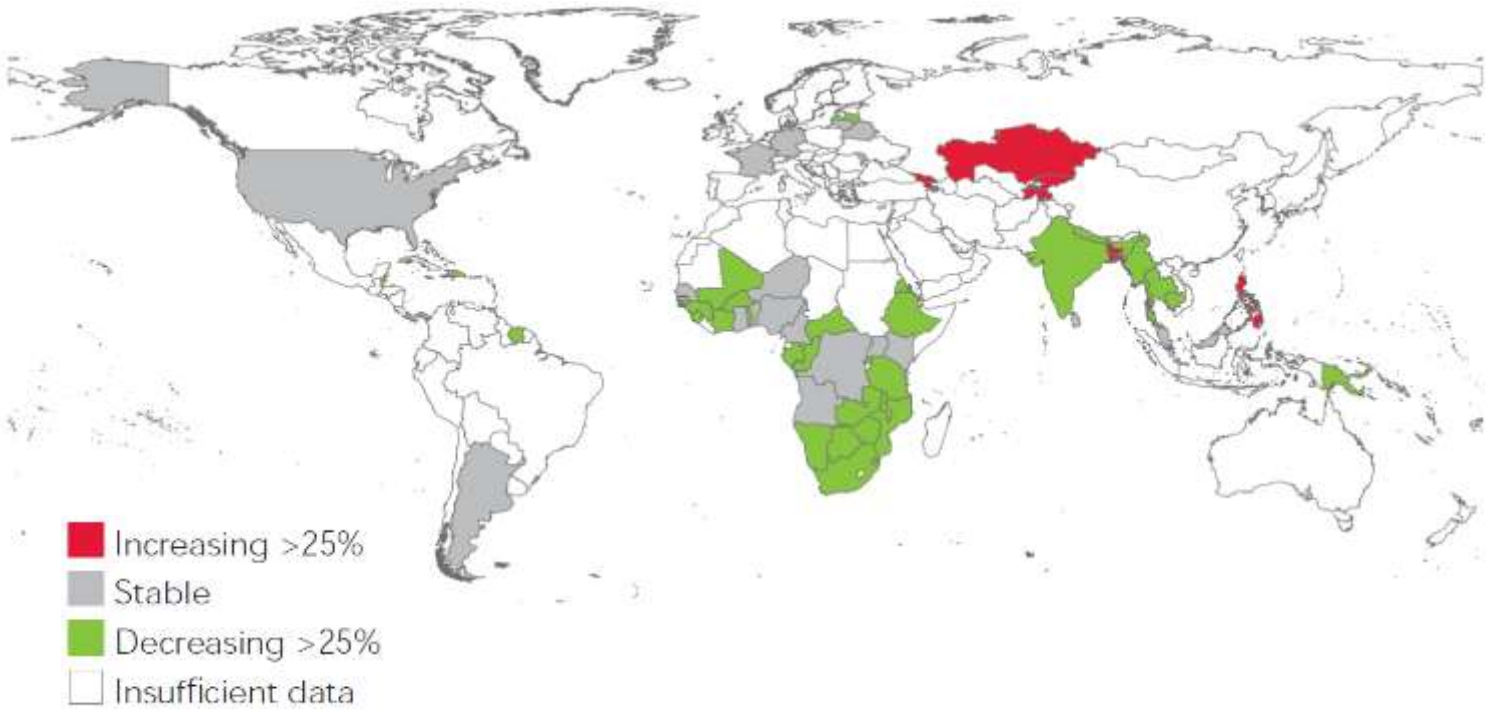


Dotted lines represent ranges, solid lines represent the best estimate.

World Health Organization

Figure 2.2

Changes in the incidence of HIV infection, 2001 to 2009 (56 countries declinig or stable)



To assess changes in incidence, the estimated national incidence rate was compared between 2009 and 2001. Countries with a change (decrease or increase) in the incidence rate of 25% or more during this period were identified. In most cases, the assessment was based on EPP/Spectrum modelling results (1,2). For selected countries, published analyses of country-level incidence were also used. The EPP/Spectrum criteria for including countries in this analysis were as follows. EPP files were available and trends in EPP were not derived from workbook prevalence estimates; prevalence data were available up to at least 2007; there were at least four time points between 2001 and 2009 for which prevalence data were available for concentrated epidemics and at least three data points in the same period for generalized epidemics; for the majority of epidemic curves for a given country, EPP did not produce an artificial increase in HIV prevalence in recent years due to scarcity of prevalence data points; data were representative of the country; the EPP/Spectrum–derived incidence trend was not in conflict with the trend in case reports of new HIV diagnoses; and the EPP/Spectrum–derived incidence trend was not in conflict with modelled incidence trends derived from age-specific prevalence in national survey results.

Source: UNAIDS.

World Health Organization

Score card: Incidence trends in selected countries

Big increase but small numbers

Increasing >25%

Armenia
Bangladesh
Georgia
Kazakhstan
Kyrgyzstan
Philippines
Tajikistan

23 countries

Stable

Angola
Argentina
Belarus
Benin
Cameroon
Democratic Republic of the Congo
Djibouti
France
Germany
Ghana
Haiti
Kenya
Lesotho
Lithuania
Malaysia
Niger
Nigeria
Panama
Republic of Moldova
Senegal
Sri Lanka
Uganda
United States of America

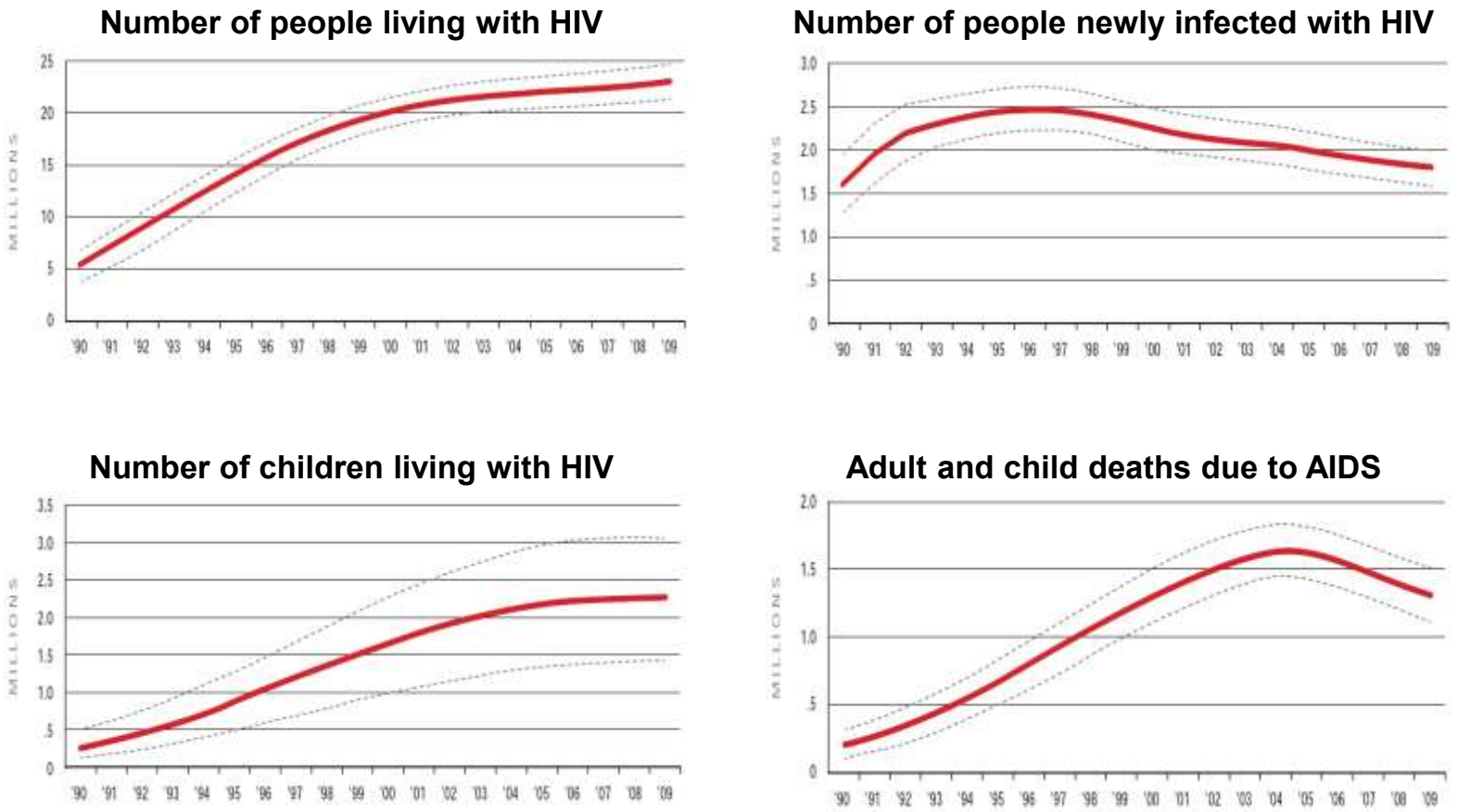
33 countires

Decreasing >25%

Belize
Botswana
Burkina Faso
Cambodia
Central African Republic
Congo
Côte d'Ivoire
Dominican Republic
Eritrea
Ethiopia
Gabon
Guinea
Guinea-Bissau
India
Jamaica
Latvia
Malawi
Mali
Mozambique
Myanmar
Namibia
Nepal
Papua New Guinea
Rwanda
Sierra Leone
South Africa
Suriname
Swaziland
Thailand
Togo
United Republic of Tanzania
Zambia
Zimbabwe

Figure 2.8

HIV trends in sub-Saharan Africa



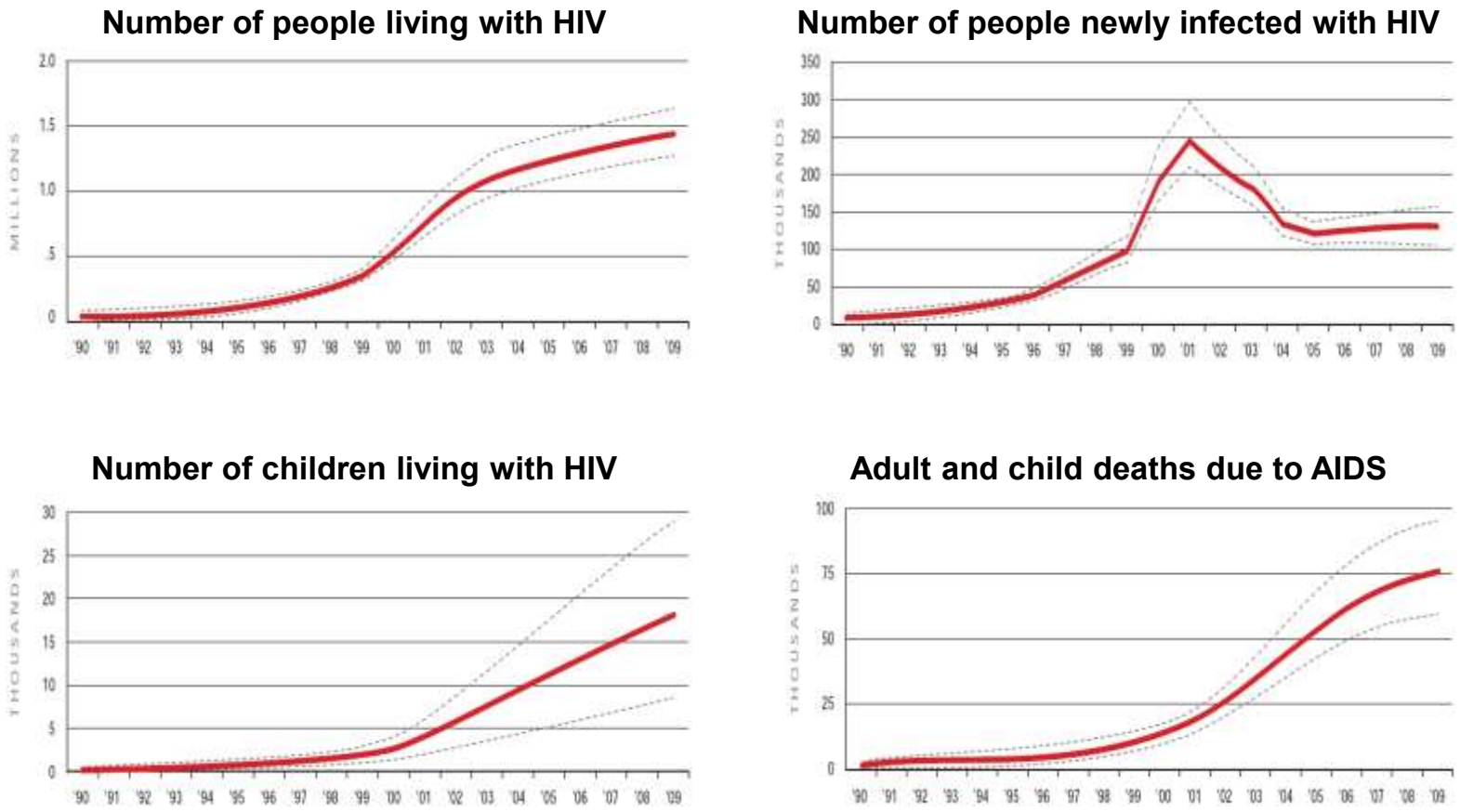
Dotted lines represent ranges, solid lines represent the best estimate.

Source: UNAIDS.

World Health Organization

Figure 2.13

HIV trends in Eastern Europe and Central Asia



Dotted lines represent ranges, solid lines represent the best estimate.

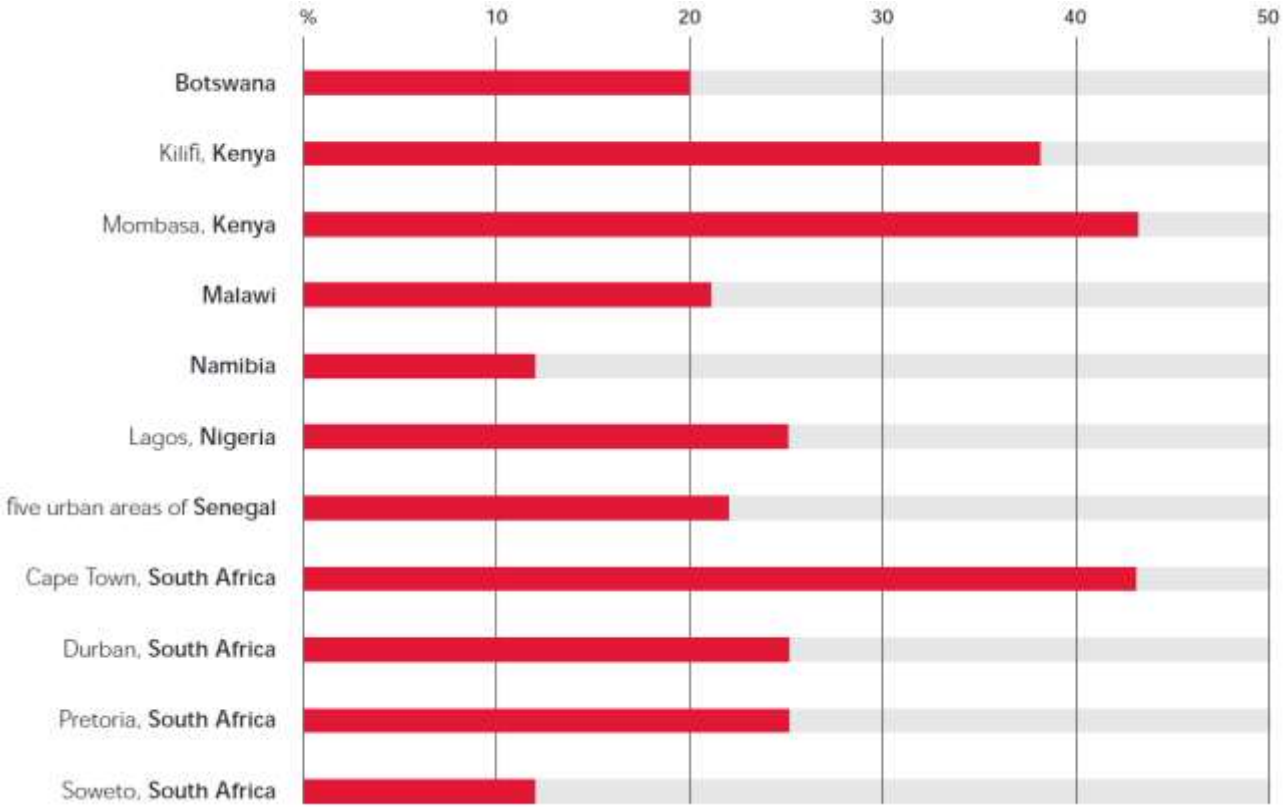
Source: UNAIDS.

World Health Organization

Figure 2.9

HIV among men who have sex with men in sub-Saharan Africa

HIV prevalence (%) among male adults 15–49 years old who have sex with men in seven countries in sub-Saharan Africa, 2009 or latest available year.



Source: Baral et al. (28); Nigeria Federal Ministry of Health (29); Lane et al. (30); Parry et al. (31); Sander et al. (32); Sander et al. (33); and Wade et al. (34).

World Health Organization

Global summary of the AIDS epidemic 2010

Number of people living with HIV	Total	34.0 million [31.6 million–35.2 million]
	Adults	30.1 million [28.4 million–31.5 million]
	Women	16.8 million [15.8 million–17.6 million]
	Children (<15 years)	3.4 million [3.0 million–3.8 million]
People newly infected with HIV in 2010	Total	2.7 million [2.4 million–2.9 million]
	Adults	2.3 million [2.1 million–2.5 million]
	Children (<15 years)	390 000 [340 000–450 000]
AIDS deaths in 2010	Total	1.8 million [1.6 million–1.9 million]
	Adults	1.5 million [1.4 million–1.6 million]
	Children (<15 years)	250 000 [220 000–290 000]

Over 7000 new HIV infections a day in 2010

- About 97% are in low and middle income countries
- About 1000 are in children under 15 years of age
- About 6000 are in adults aged 15 years and older, of whom:
  - almost 48% are among women
  - about 42% are among young people (15-24)

Outline

- HIV transmission factors
- HIV global epidemiological overview
- Some data in the national response
- What are the current issues

GLOBAL HIV/AIDS RESPONSE

Epidemic update and health sector progress towards Universal Access

Progress Report 2011

World Health Organization

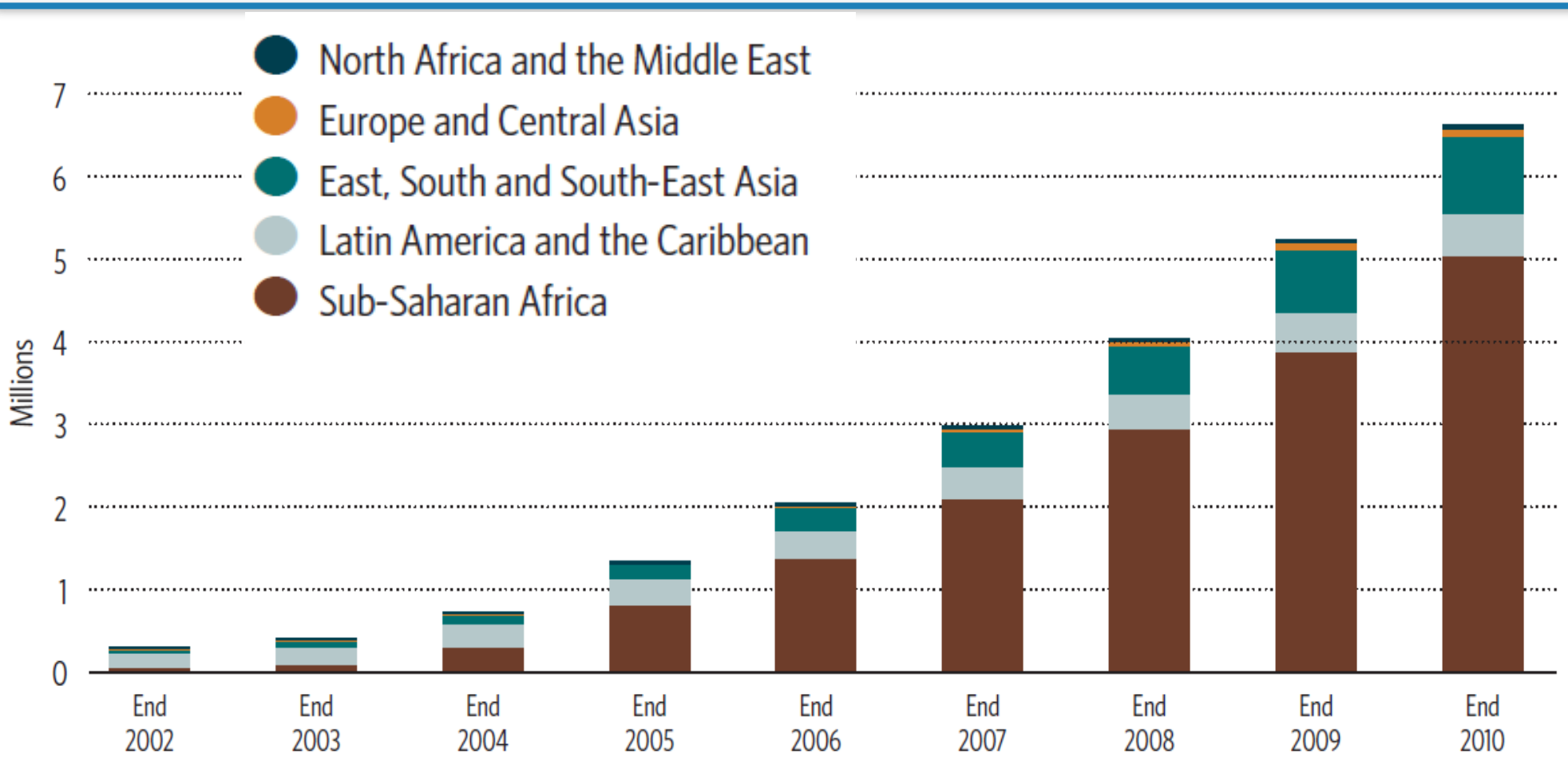
UNAIDS

unicef

Percentage of women and men who received an HIV test and test results in the 12 months preceding the survey in countries with repeat population surveys, 2003–2010

World Health Organization

Number of people receiving antiretroviral therapy in low- and middle-income countries, by region, 2002–2010



World Health Organization

Number of people (all age groups) receiving and needing antiretroviral therapy, and percentage coverage in low- and middle-income countries by region, 2009 to 2010

Geographical region	December 2010			December 2009		
	Number of people receiving antiretroviral therapy	Estimated number of people eligible for antiretroviral therapy [range][a]	Antiretroviral therapy coverage [range][d]	Number of people receiving antiretroviral therapy	Estimated number of people eligible for antiretroviral therapy [range][a]	Antiretroviral therapy coverage [range][d]
Sub-Saharan Africa	5 064 000	10 400 000 [9 700 000–11 000 000]	49% [46–52%]	3 911 000	9 600 000 [9 000 000–10 200 000]	41% [38–43%]
Eastern and southern Africa	4 221 000	7 600 000 [7 100 000–8 000 000]	56% [53–59%]	3 203 000	7 000 000 [6 600 000–7 400 000]	46% [43–48%]
Western and central Africa	842 000	2 800 000 [2 600 000–3 100 000]	30% [28–33%]	709 000	2 600 000 [2 400 000–2 800 000]	27% [25–30%]
Latin America and the Caribbean	521 000	820 000 [710 000–920 000]	63% [57–73%]	469 000	780 000 [670 000–870 000]	60% [54–70%]
Latin America	461 000	720 000 [620 000–810 000]	64% [57–74%]	416 000	690 000 [590 000–780 000]	60% [53–70%]
Caribbean	60 300	100 000 [91 000–110 000]	60% [53–67%]	52 400	93 000 [84 000–110 000]	56% [50–63%]
East, South and South-East Asia	922 000	2 300 000 [2 100 000–2 500 000]	39% [36–44%]	748 000	2 300 000 [2 000 000–2 400 000]	33% [31–37%]
Europe and Central Asia	129 000	570 000 [500 000–650 000]	23% [20–26%]	114 500	520 000 [450 000–600 000]	22% [19–25%]
North Africa and the Middle East	14 900	150 000 [120 000–190 000]	10% [8–13%]	12 400	140 000 [110 000–180 000]	9% [7–12%]
Total	**6 650 000**	**14 200 000 [13 400 000–15 000 000]**	**47% [44–50%]**	**5 255 000**	**13 300 000 [12 400 000–14 100 000]**	**39% [37–42%]**

Note: some numbers do not add up because of rounding.
a See Box 5.9 for further information on the methods for estimating the need for and coverage of antiretroviral therapy in 2010.
b The 2009 figures may differ from those previously published because countries have submitted newly available data.
c All estimated needs have been developed according to 2010 WHO guidelines and criteria for initiating treatment.
d The coverage estimate is based on the unrounded estimated numbers of people receiving and needing antiretroviral therapy.

World Health Organization

Low- and middle-income countries with estimated antiretroviral therapy coverage levels of 50–69%, 70–79% and 80% or higher as of December 2010

Antiretroviral therapy coverage			
50-69% (31 countries)		70-79% (7 countries)	80% or higher (10 countries)
Belarus	Lesotho	Argentina	Botswana
Belize	Malawi	Brazil	Cambodia
Benin	Papua New Guinea	Dominican Republic	Chile
Costa Rica	Paraguay	Mexico	Croatia
Ecuador	Peru	Swaziland	Cuba
El Salvador	Philippines	Uruguay	Guyana
Ethiopia	Romania	Zambia	Namibia
Gabon	Senegal		Nicaragua
Georgia	South Africa		Rwanda
Guatemala	Thailand		Slovakia
Guinea	Togo		
Haiti	Turkey		
Honduras	Venezuela (Bolivarian Republic of)		
Jamaica	Viet Nam		
Kenya	Zimbabwe		
Lao People's Democratic Republic			

Comparison of number of men and women receiving and estimated to need antiretroviral therapy and percentage coverage, by region, December 2010[a]

Geographical region (number of countries reporting/total countries in region)	Men			Women		
	Coverage[a]	Number receiving antiretroviral therapy	Estimated number who need it	Coverage[a]	Number receiving antiretroviral therapy	Estimated number who need it
Sub-Saharan Africa (44/46)	41%	1 751 900	4 300 000	55%	3 060 100	5 600 000
Eastern and southern Africa (20/22)	48%	1 467 400	3 100 000	62%	2 503 300	4 000 000
Western and central Africa (24/24)	23%	284 500	1 200 000	35%	556 800	1 600 000
Latin America and the Caribbean (20/29)	64%	322 900	500 000	62%	177 600	280 000
Latin America (16/20)	64%	292 800	455 000	64%	147 800	230 000
Caribbean (4/9)	64%	30 100	47 000	56%	29 800	53 000
East, South and South-East Asia (20/34)	34%	521 800	1 600 000	48%	399 700	830 000
Europe and Central Asia (18/26)	20%	27 100	140 000	20%	20 600	100 000
North Africa and the Middle East (7/14)	9%	7 600	86 000	9%	5 600	61 000
Total (109/149)	**40%**	**2 631 300**	**6 600 000**	**53%**	**3 663 500**	**6 900 000**

a The coverage estimate is based on the unrounded numbers of people receiving and needing antiretroviral therapy.

Number of children 0–14 years old and adults on antiretroviral therapy in low- and middle-income countries, by region, December 2010[a]

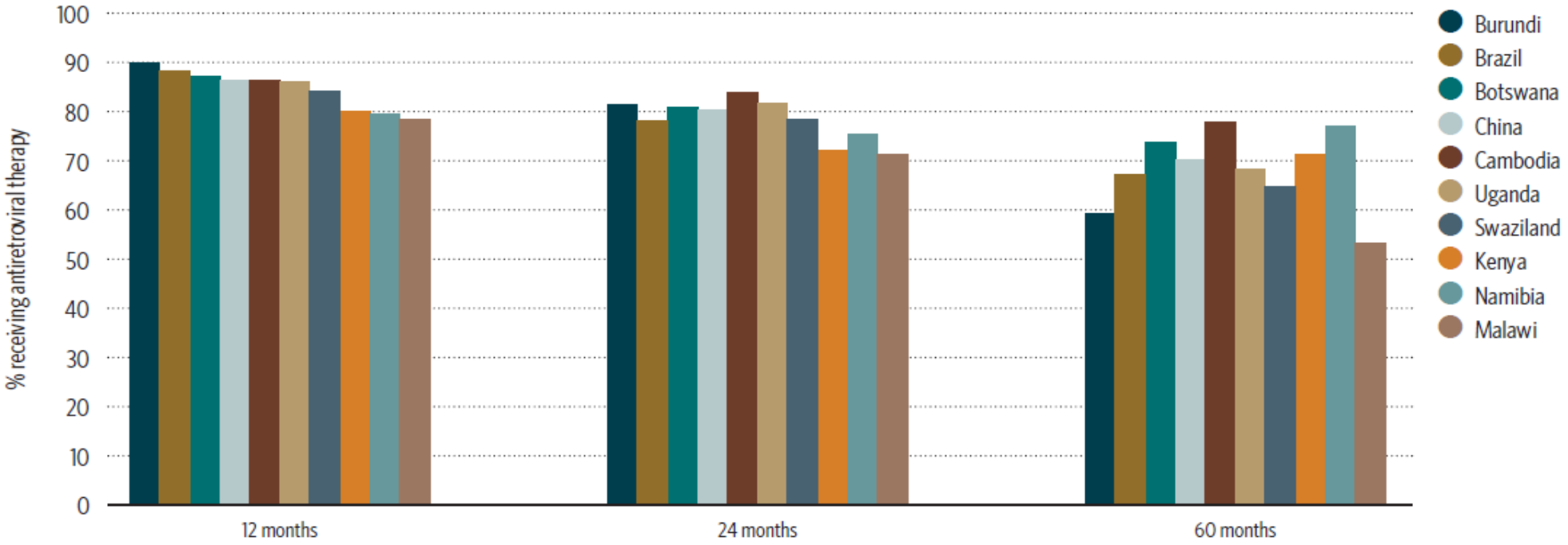
Geographical region	Number of children receiving antiretroviral therapy, December 2010	Estimated number of children needing antiretroviral therapy, 2010 [range]	Antiretroviral therapy coverage among children, December 2010 [range][b]	Antiretroviral therapy coverage among adults, December 2010 [range][b]
Sub-Saharan Africa	387 500	1 840 000 [1 600 000–2 100 000]	21% [19–24%]	55% [52–58%]
Eastern and southern Africa	337 200	1 290 000 [1 100 000–1 400 000]	26% [23–29%]	62% [59–65%]
Western and central Africa	50 200	550 000 [480 000–630 000]	9% [8–11%]	35% [33–38%]
Latin America and the Caribbean	16 300	41 400 [34 000–50 000]	39% [32–48%]	64% [58–74%]
Latin America	13 600	30 600 [25 000–38 000]	44% [36–55%]	65% [58–75%]
Caribbean	2 700	10 800 [8 700–13 000]	25% [21–31%]	64% [57–70%]
East, South and South-East Asia	43 800	113 000 [84 000–140 000]	39% [30–52%]	39% [37–43%]
Europe and Central Asia	7 500	11 400 [10 000–13 000]	65% [55–71%]	22% [19–25%]
North Africa and the Middle East	840	18 500 [12 000–25 000]	5% [3–7%]	10% [8–14%]
All low- and middle-income countries	**456 000**	**2 020 000 [1 800 000–2 300 000]**	**23% [20–25%]**	**51% [48–54%]**

Note: some numbers do not add up because of rounding.

a For an explanation of the methods used, see the explanatory notes for Annex 4 and 5, and Box 5.9.

b The coverage estimate is based on the unrounded numbers of people receiving and needing antiretroviral therapy.

Retention rates for antiretroviral therapy at 12, 24 and 60 months for selected countries



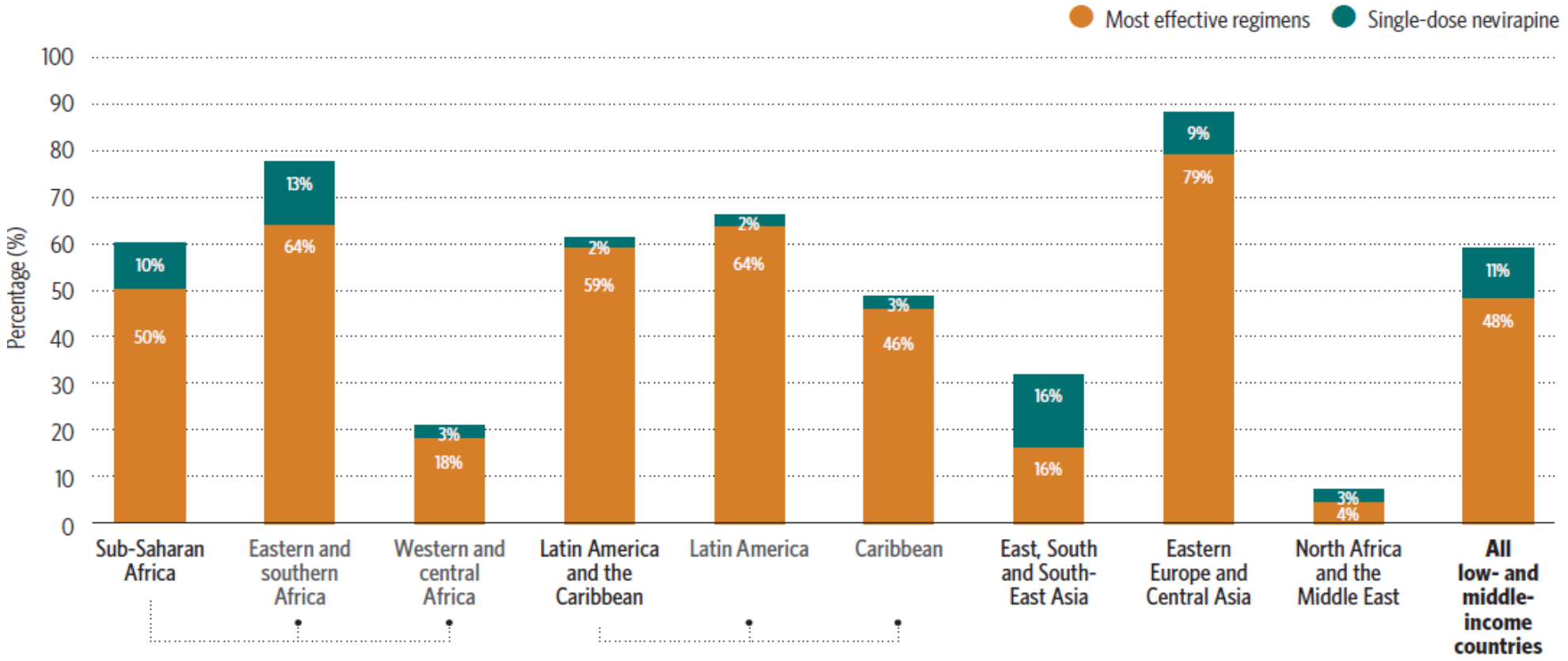
World Health Organization

Estimated number of women living with HIV needing and receiving antiretroviral medicine for PMTCT in low- and middle-income countries, 2010

Geographical region	Number of pregnant women living with HIV receiving the most effective antiretroviral regimens (excluding single-dose nevirapine) for preventing mother-to-child transmission	Estimated number of pregnant women living with HIV who need antiretroviral medicine for preventing mother-to-child transmission	Estimated coverage with the most effective regimens, as recommended by WHO	Estimated coverage with single-dose nevirapine only (regimen no longer recommended by WHO)
Sub-Saharan Africa	674 000	1 360 000 [1 200 000–1 500 000]	**50% [45–56%]**	10%
Eastern and southern Africa	600 700	940 000 [840 000–1 000 000]	**64% [57–71%]**	13%
Western and central Africa	73 300	410 000 [360 000–470 000]	**18% [15–20%]**	3%
Latin America and the Caribbean	15 000	25 600 [17 000–33 000]	**59% [46–90%]**	2%
Latin America	11 700	18 300 [11 000–25 000]	**64% [47–>95%]**	2%
Caribbean	3 300	7 300 [5 900–9 000]	**46% [37–57%]**	3%
East, South and South-East Asia	12 200	73 800 [53 000–95 000]	**16% [13–23%]**	16%
Europe and Central Asia	14 700	18 600 [15 000–22 000]	**79% [65–94%]**	9%
North Africa and the Middle East	600	14 200 [9 900–19 000]	**4% [3–6%]**	3%
All low- and middle-income countries	**716 500**	**1 490 000 [1 300 000–1 600 000]**	**48% [44–54%]**	11%

World Health Organization

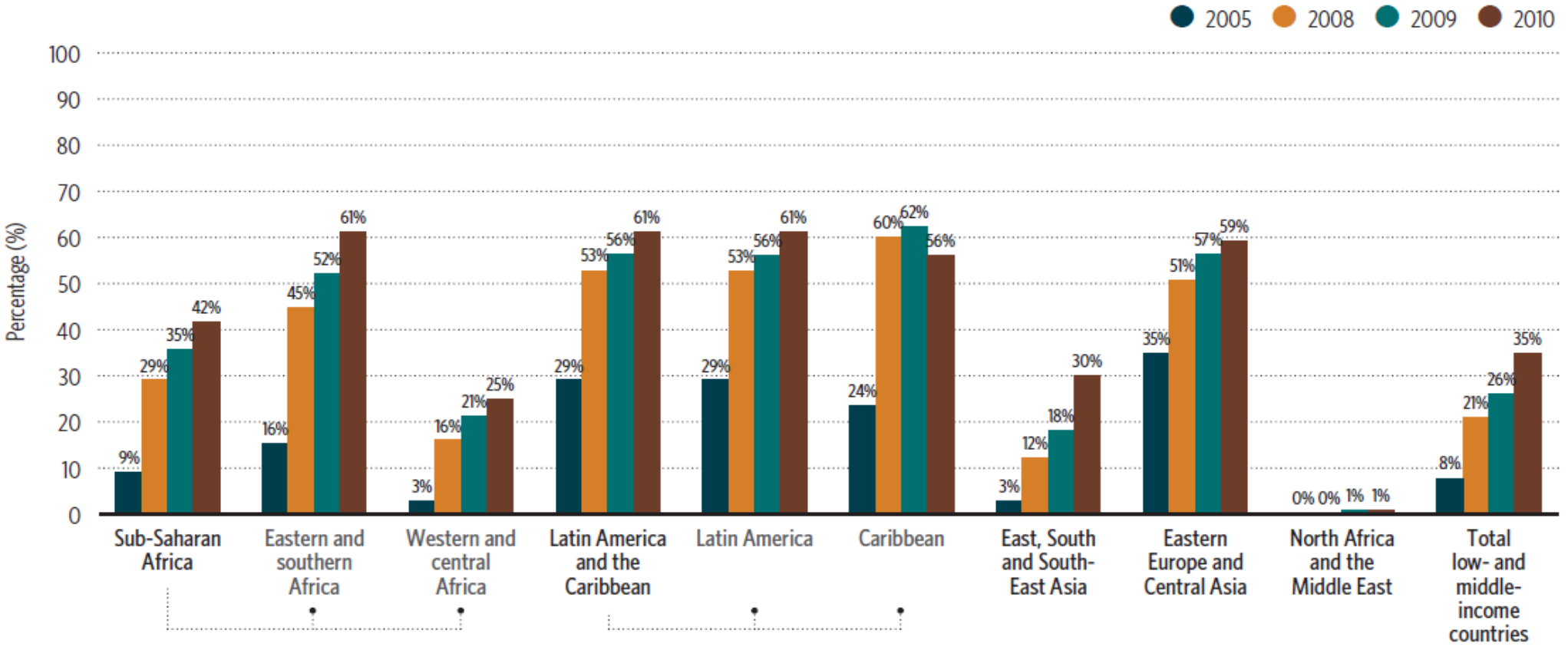
Coverage of antiretroviral medicine for preventing mother-to-child transmission: most effective regimens and single-dose nevirapine, low- and middle-income countries, by region, 2010[a]



a Single-dose nevirapine is no longer recommended by WHO

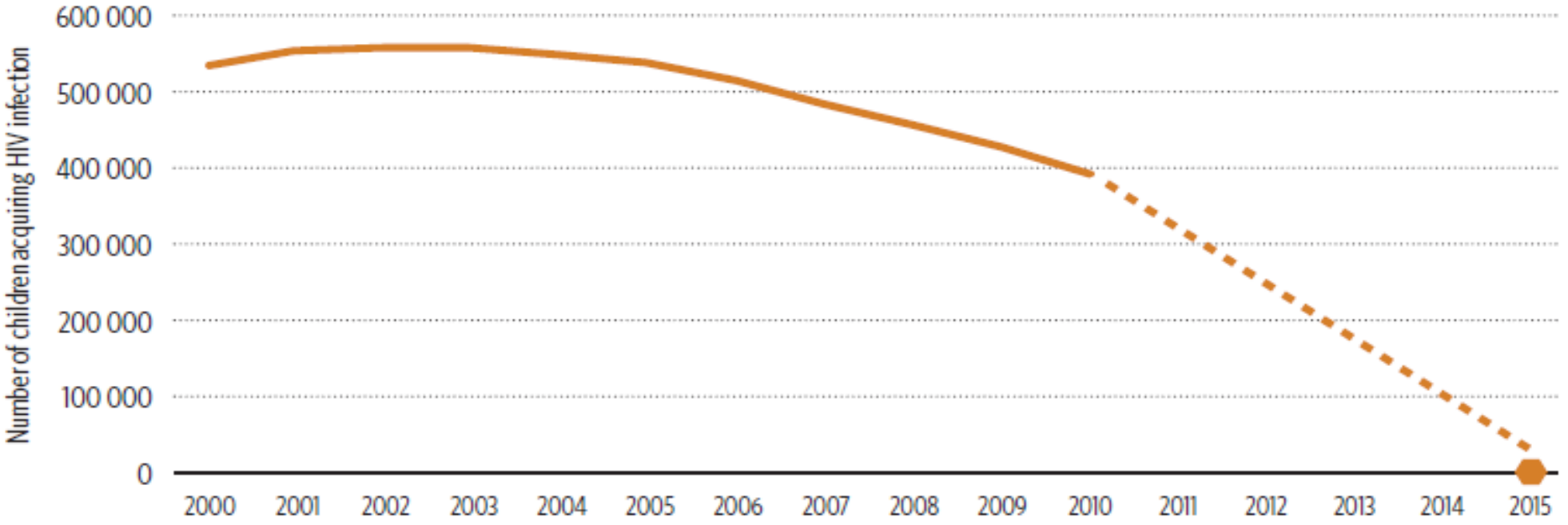
World Health Organization

Percentage of pregnant women who received an HIV test in the past 12 months in low- and middle-income countries by region, 2005 and 2008–2010



World Health Organization

Estimated number of children newly infected with HIV in low- and middle-income countries, 2000–2015



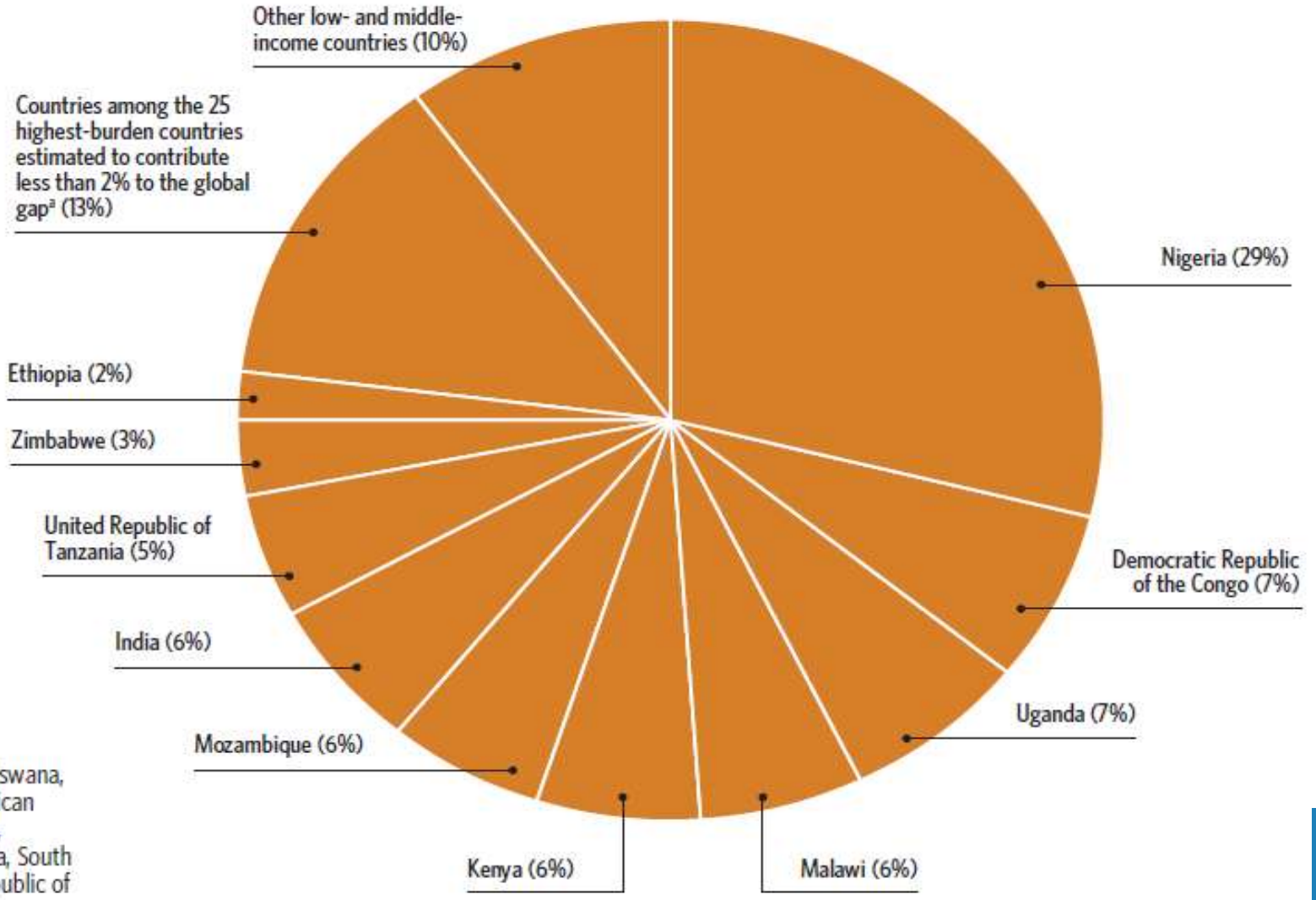
World Health Organization

Low- and middle-income countries achieving ≥80% coverage with effective regimens of antiretroviral medicine for preventing mother-to-child transmission, 2010

Region	Number of countries[a]	Countries
Sub-Saharan Africa	5	Botswana, Lesotho, Namibia, South Africa and Swaziland
Latin America and the Caribbean	4	Argentina, Brazil, Ecuador and Honduras
Eastern Europe and Central Asia	3	Belarus, Romania and Ukraine

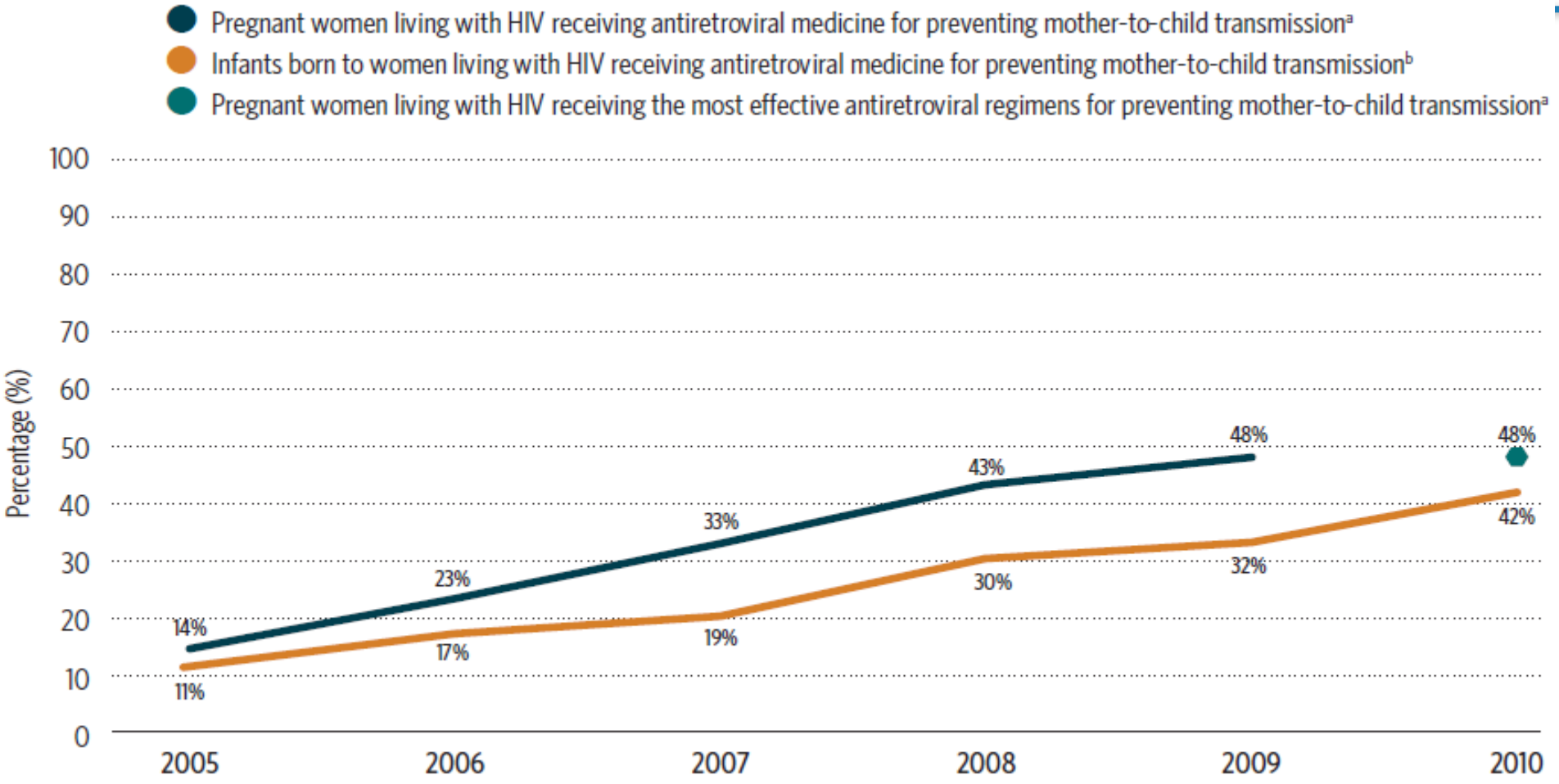
a Countries with at least 100 pregnant women estimated to need antiretroviral medicine for preventing mother-to-child transmission.

Countries with the largest contribution to the global gap in reaching 90% of pregnant women living with HIV in need with antiretroviral medicine for preventing mother-to-child transmission, 2010



a These countries include Angola, Botswana, Burkina Faso, Cameroon, Central African Republic, Chad, Côte d'Ivoire, Ghana, Lesotho, Russian Federation, Rwanda, South Africa, Sudan, Swaziland, United Republic of Tanzania, Zambia, Zimbabwe.

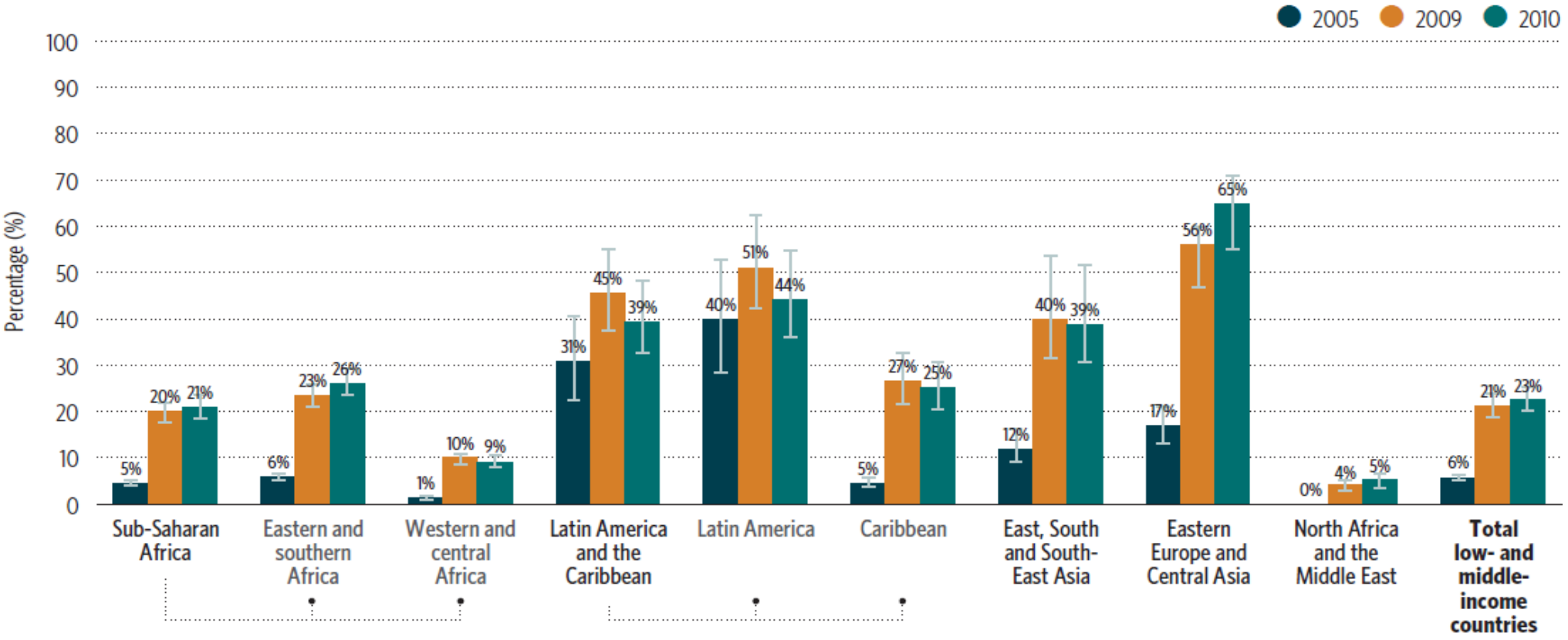
% of pregnant women living with HIV and their infants who received antiretroviral medicine for preventing mother-to-child transmission, low- and middle-income countries, 2005–2010



a Coverage in 2010 cannot be compared with previous years as it does not include single-dose nevirapine which is no longer recommended by WHO.
b This includes only the initial (4-6 weeks) prophylaxis for infants.

World Health Organization

Percentage of children living with HIV receiving antiretroviral therapy in low- and middle-income countries, 2005, 2009 and 2010



World Health Organization

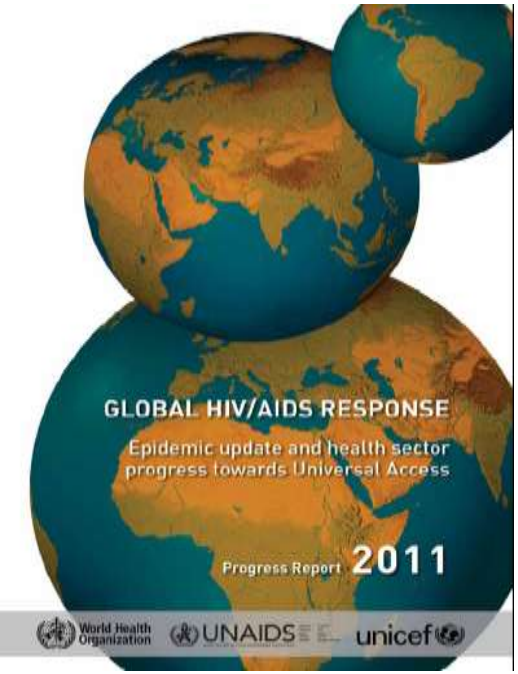
Impact of interventions

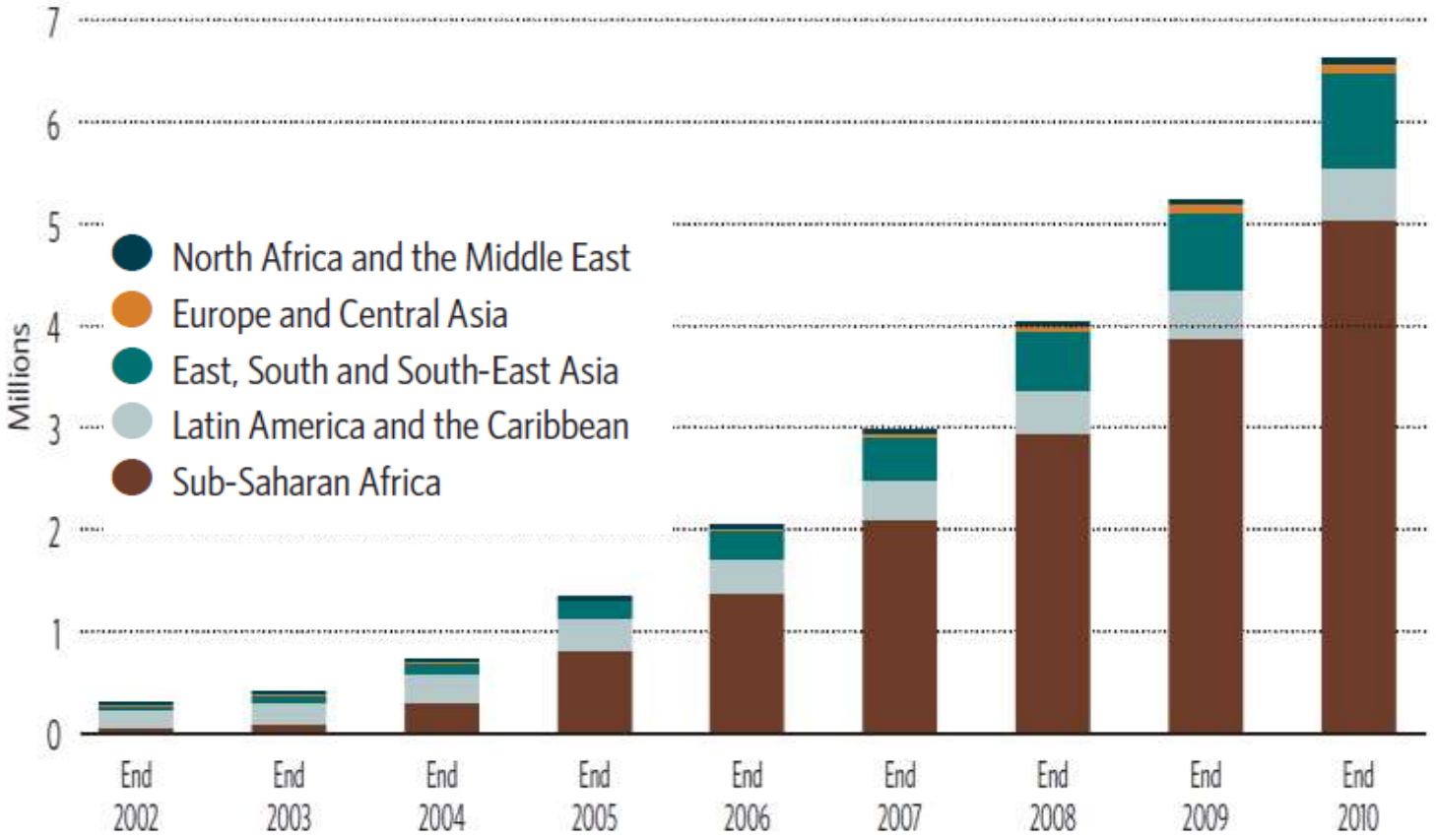
From modelling to empirical data

Outline

- HIV transmission factors
- HIV global epidemiological overview
- Some data in the national response
- What are the current issues

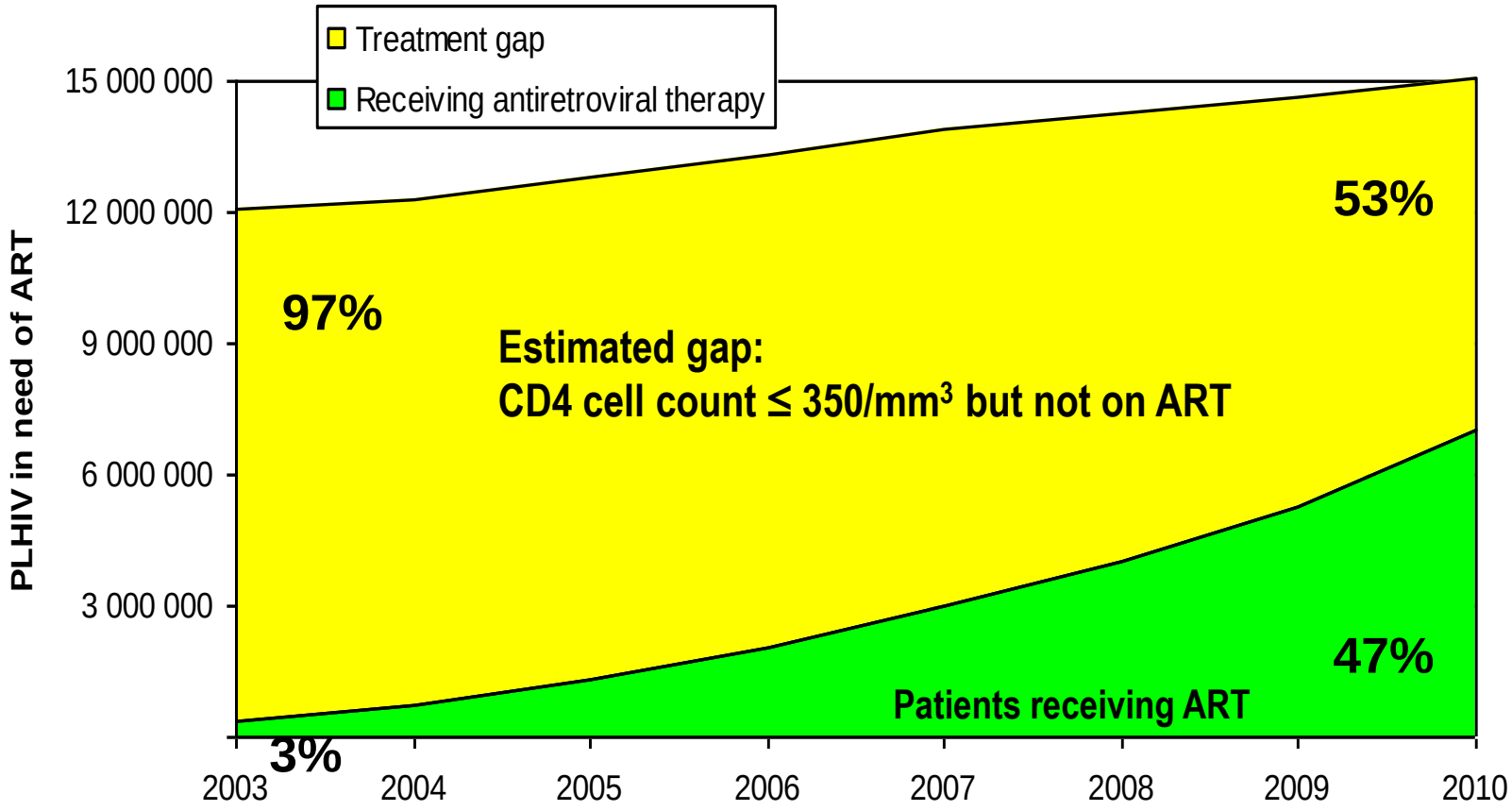
Number of people receiving antiretroviral therapy in low- and middle-income countries 2002–2010





World Health Organization

Progress of estimated ART coverage in low- and middle-income countries (2003-2010)



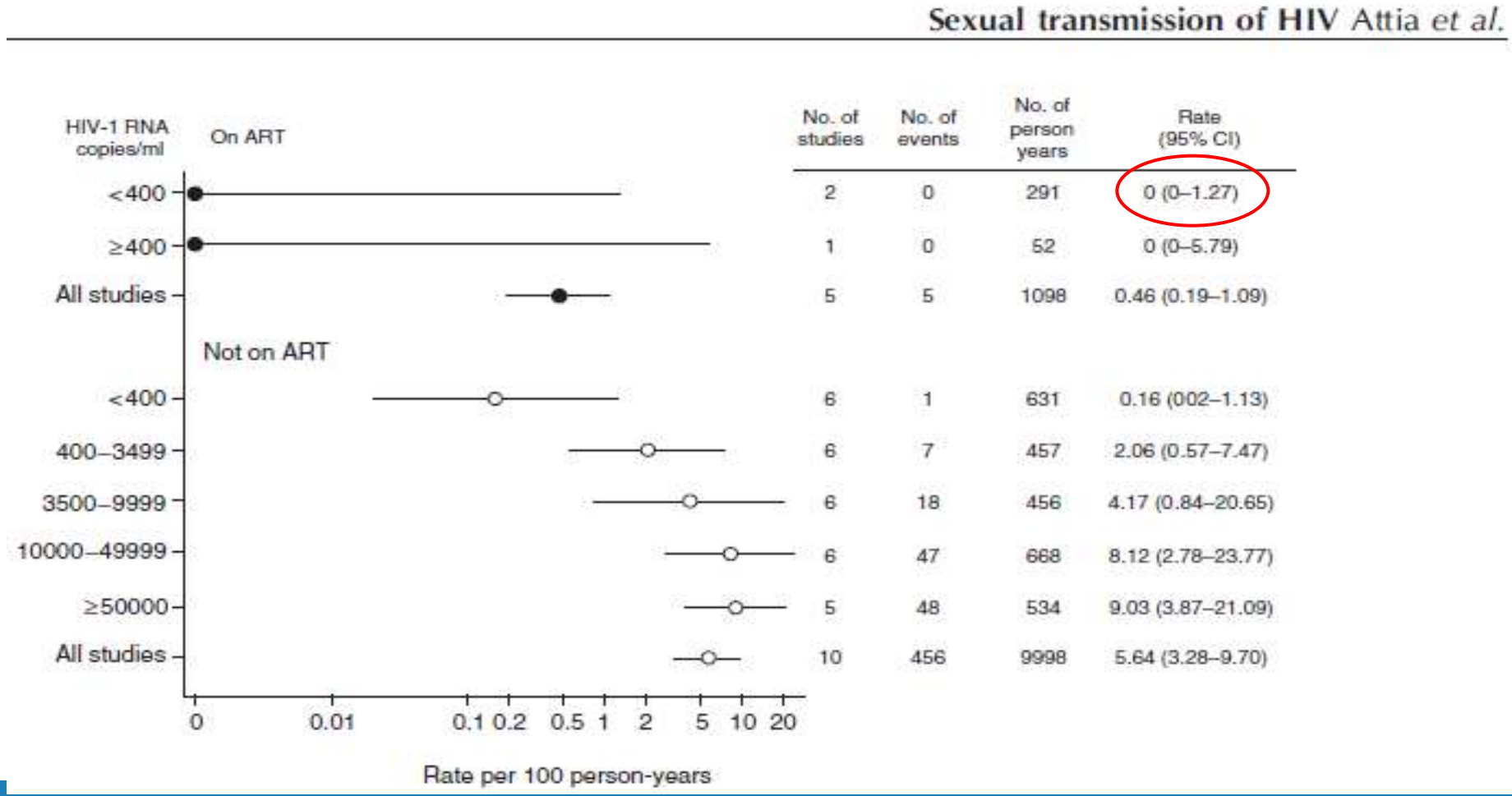
World Health Organization

WHO, 2011

Evidence supports ART for prevention of HIV transmission

- Transmission only occurs from persons with HIV
- Viral load is single greatest risk factor for HIV transmission
- ART can lower viral load to undetectable levels
- PMTCT proof of concept of ART reducing transmission
- Observational evidence in heterosexual couples
- Knowing one's HIV status is key to ART for prevention
- When to start ART is not known with certainty but science increasingly supports earlier start

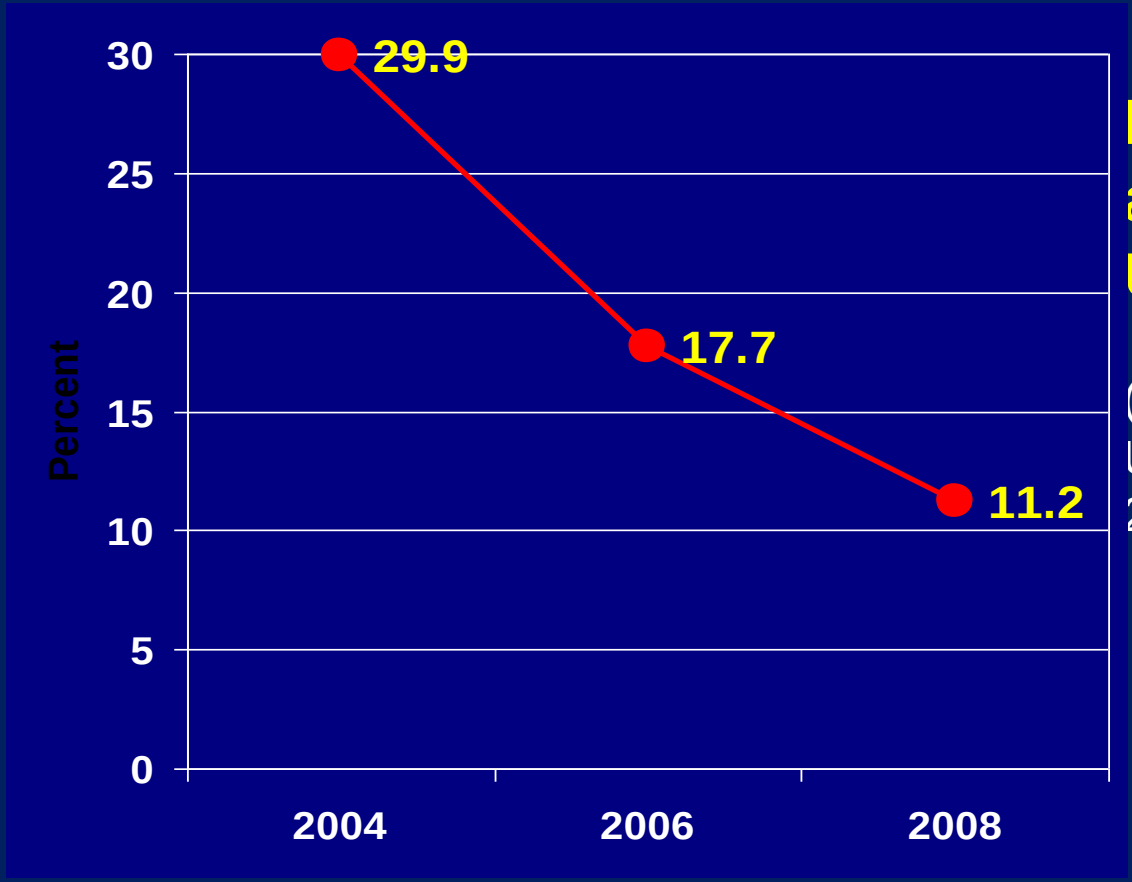
ART reduces sexual transmission of HIV: meta-analysis shows no transmission <400 copies/ml



Attia S, et al.AIDS 2009 Jul 17;23(11):1397-404.

World Health Organization

IDUs epidemic and response in Ukraine: a success story?

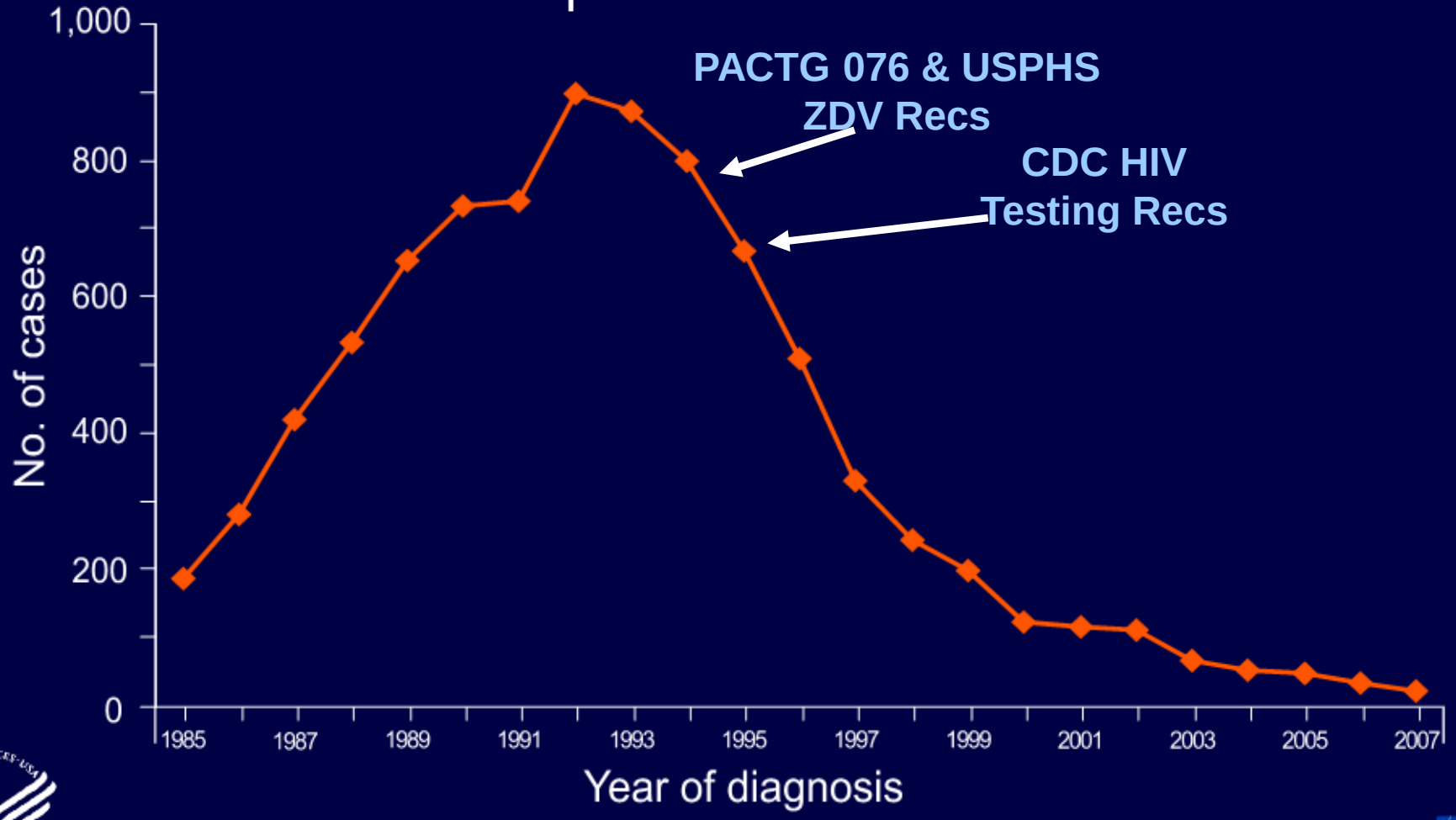


Decrease in HIV prevalence among recent Injecting Drug Users

(median sentinel surveillance in 8 cities, Ukraine - International HIV/AIDS Alliance, 2009)

World Health Organization

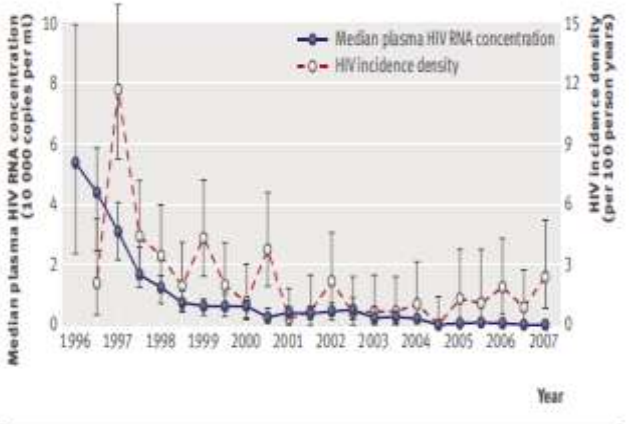
Estimated Numbers of Perinatally Acquired AIDS Cases by Year of Diagnosis, 1985–2007—United States and Dependent Areas



Note. Data have been adjusted for reporting delays and missing risk-factor information.

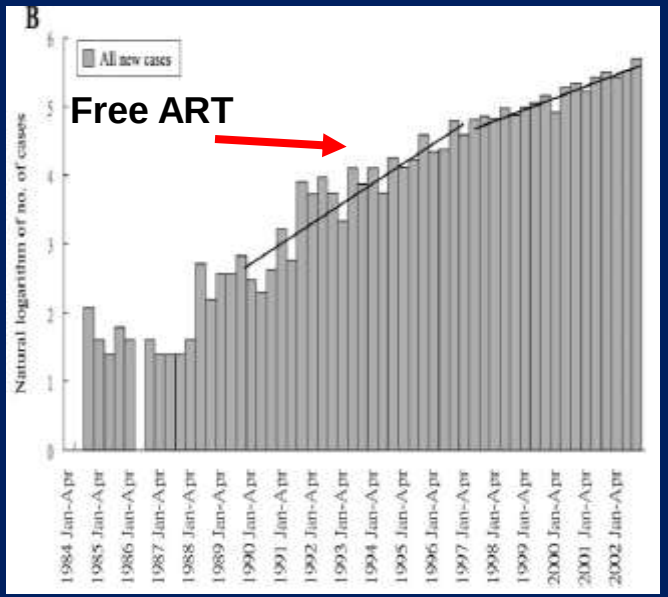
Community studies suggest population-level impact of ART

British Columbia, Canada

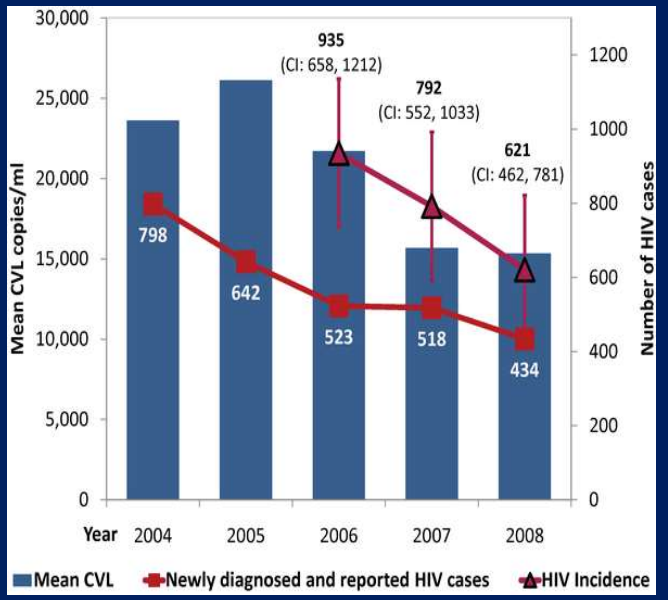


Estimated community plasma HIV-1 RNA concentrations and HIV incidence density, with 95% confidence intervals, among two parallel cohorts of injecting drug users. HIV incidence first estimated in second half of 1996 as enrolment started in May 1996 and repeat HIV tests to assess incidence were available only after six months of follow-up

Taiwan



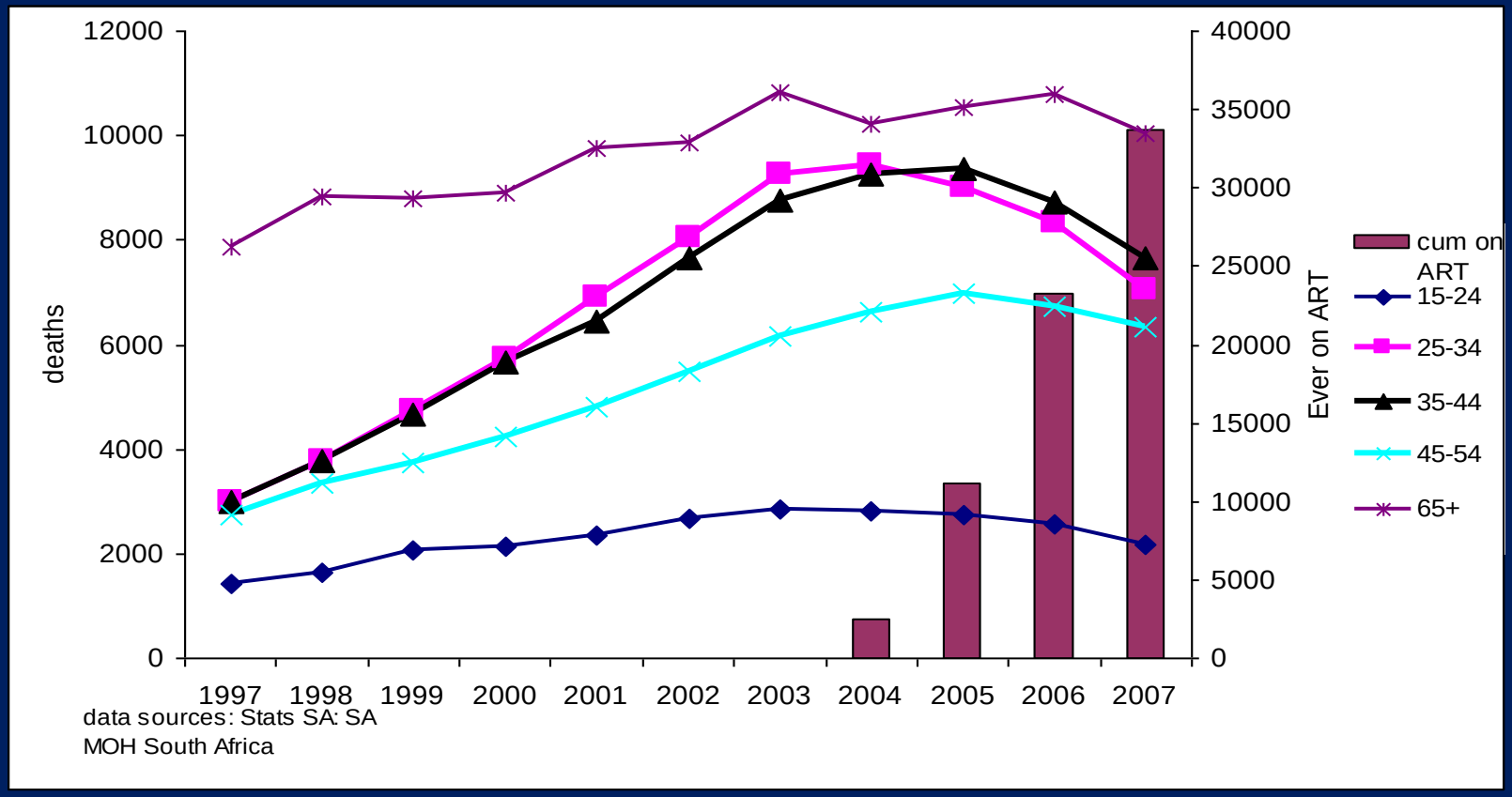
San Francisco, USA



Wood et al. BMJ 2009;338b:1649
Fang et al. JAIDS 2004;190:879-85
Das et al. PLoS ONE 2010 5(6)

World Health Organization

Growing evidence demonstrating TasP impact: ART coverage and mortality decline

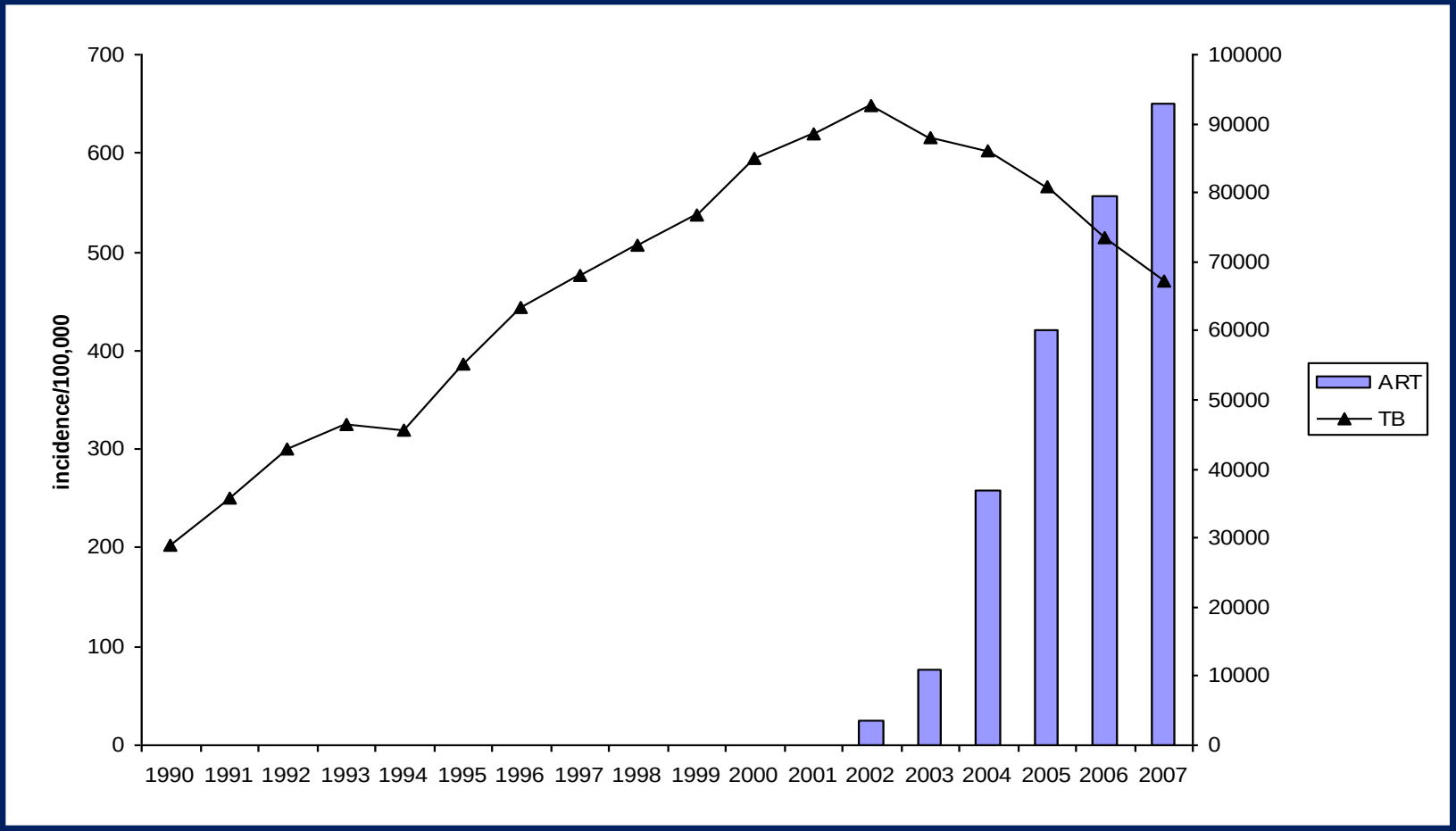


Data source: Ministry of Health, South Africa

Impact of ART on mortality in Northwest Province, South Africa

World Health Organization

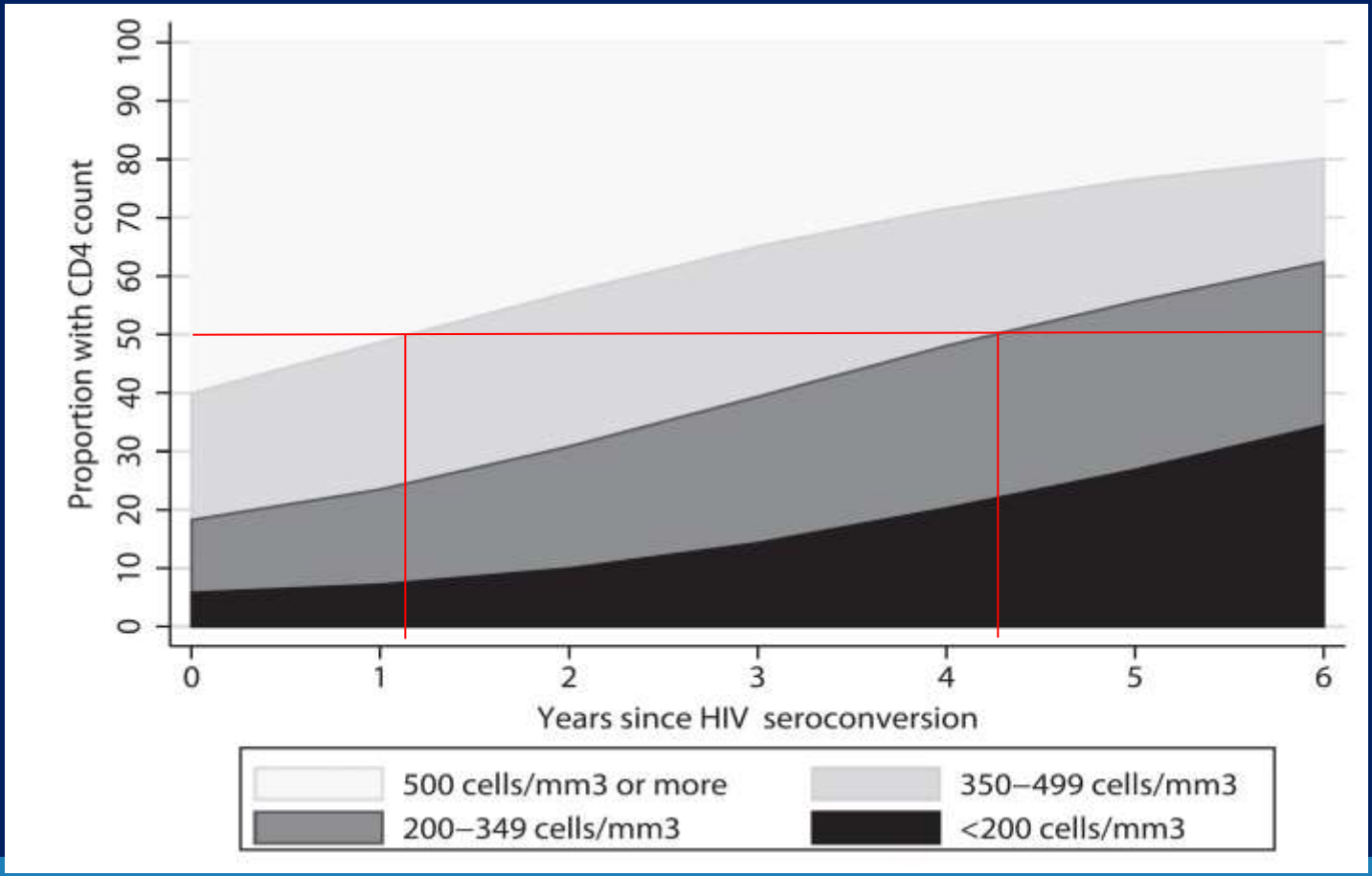
Impact of ART on TB incidence in Botswana



Sources: NASA data reported to WHO and UNAIDS by Ministry of Health, Botswana; TB Program, Ministry of Health, Botswana

World Health Organization

Time from HIV seroconversion to CD4 below: 500, 350, 200



Median year (95% CI):
< 500: 1.19 (1.12-1.26)
<350: 4.19 (4.09-4.28)
<200 : 7.93 (7.76-8.09)

CASCADE: Lodi *et al*, CID 2011

World Health Organization

Risk of AIDS or death was around 6.3% per year

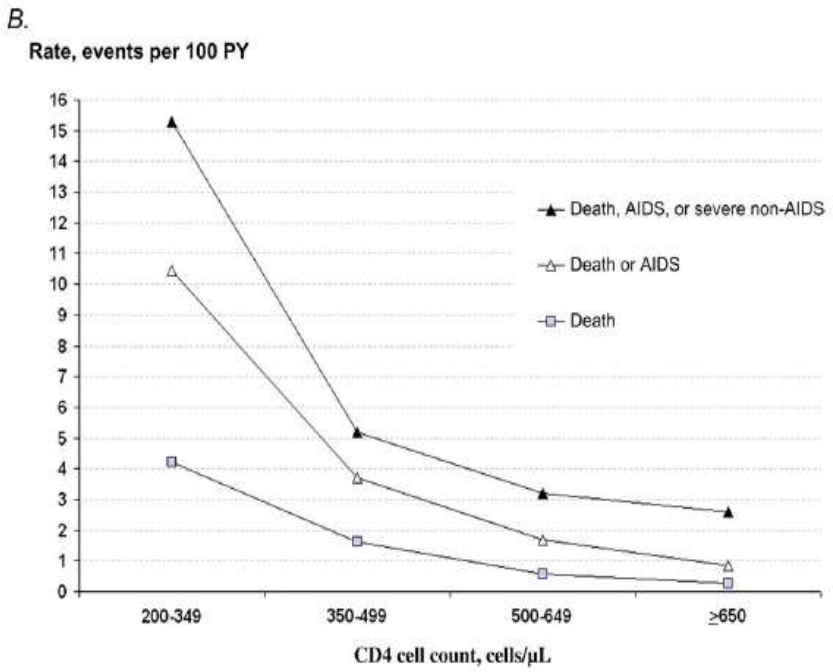


Figure 1. *A*, CD4 cell count–specific rates of mortality. *B*, CD4 cell count–specific rates of mortality for CD4 cell counts >200 cells/μL (inset in panel *A*). Severe non-AIDS includes the following illnesses: severe bacterial diseases (ie: bacterial diseases of any location with bacteremia, and the following visceral bacterial diseases: pneumonia, isolated bacteremia, pyelonephritis, prostatitis, orchiepididymitis, salpingitis, meningitis, endocarditis); and non–AIDS-defining cancers. Abbreviation: PY, person-years.

Anglaret, et al, CID 2012

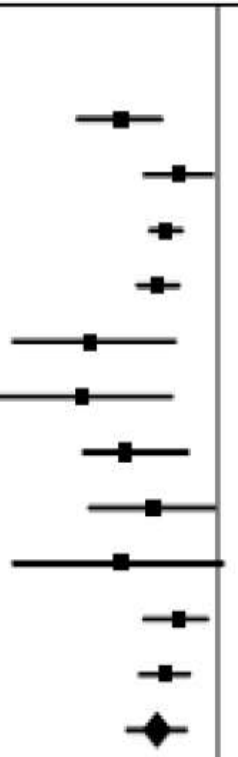
World Health Organization

Three Is for HIV/TB and earlier initiation of ART

Suthar et al 2012 ,Plos Med

	ART		Control		IRR (95% CI)
	TB cases	PY at risk	TB cases	PY at risk	
All baseline CD4 counts					
Badri (2002)	9	375.1	82	848.2	0.19 (0.09 - 0.38)
Cohen (2011)	17	1661.9	33	1641.8	0.51 (0.28 - 0.91)
Golub (2007)	221	11627	155	3865	0.41 (0.31 - 0.54)
Golub (2009)	44	952	200	2815	0.36 (0.25 - 0.51)
Jerene (2006)	6	162.6	9	80.9	0.11 (0.03 - 0.48)
Lannoy (2008)	-	-	-	-	0.10 (0.02 - 0.45)
Miranda (2007)	-	-	-	-	0.20 (0.10 - 0.60)
Samandari (2011)	-	-	-	-	0.33 (0.11 - 0.94)
Santoro-Lopes (2002)	1	-	42	-	0.19 (0.03 - 1.09)
Severe (2010)	18	-	36	-	0.50 (0.28 - 0.83)
Zhou (2009)	57	5186	40	985	0.40 (0.26 - 0.61)
All studies					**0.35 (0.28 - 0.44)**

Effect: Z = 9.19, p < 0.001; Heterogeneity: I^2 = 31% (22% - 44%) , p = 0.151



Providing ART for PLHIV prevents TB by 65%

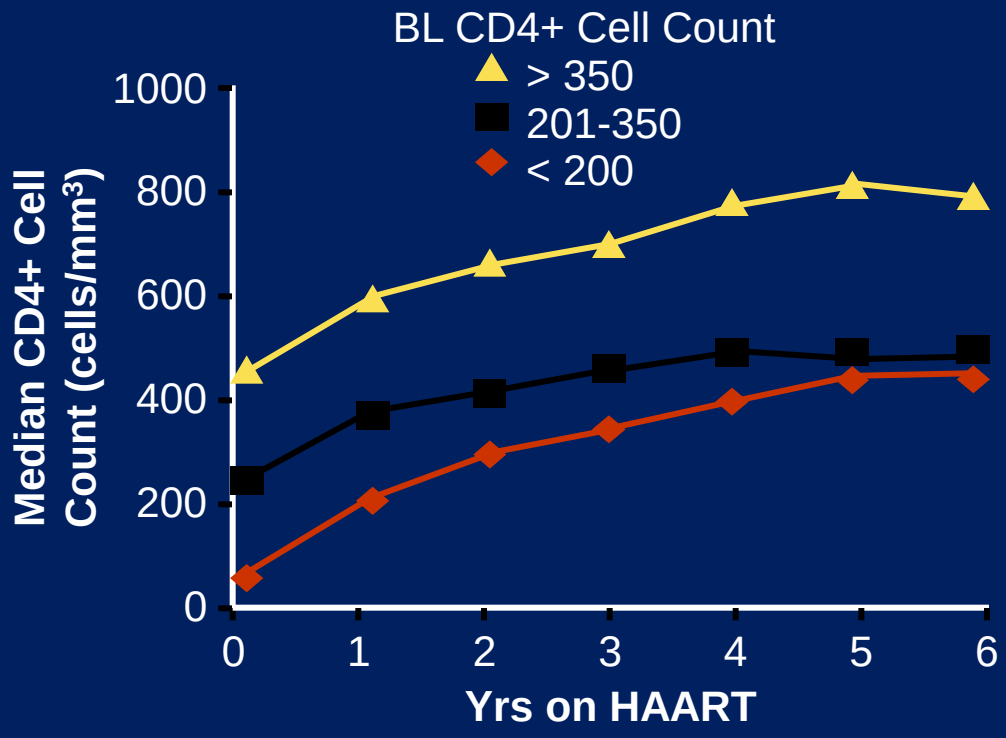
World Health Organization

HPTN 052 clinical results

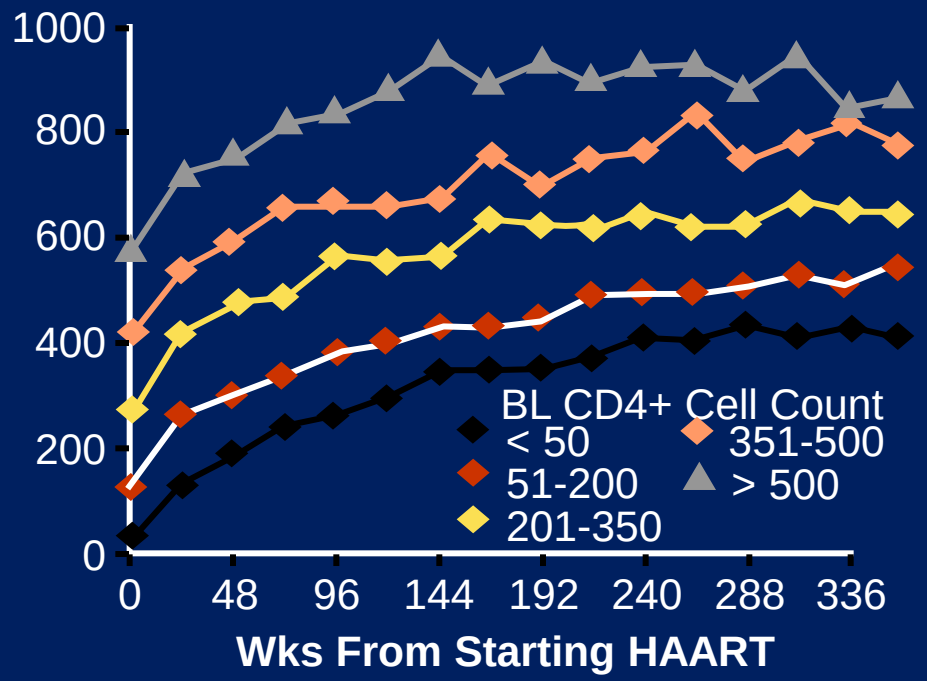
- 105 morbidity and mortality results ($p<0.01$)
  - 65 in delayed arm
  - 40 in immediate arm
- 20 cases of extrapulmonary TB ($p=0.0013$)
  - 17 in delayed
  - 3 in immediate arm
- 23 deaths (NS)
  - 13 in delayed arm
  - 10 in immediate arm

Likelihood of Achieving Normal CD4+ Cell Count on ART Depends on BL Level

Johns Hopkins HIV Clinical Cohort[1]



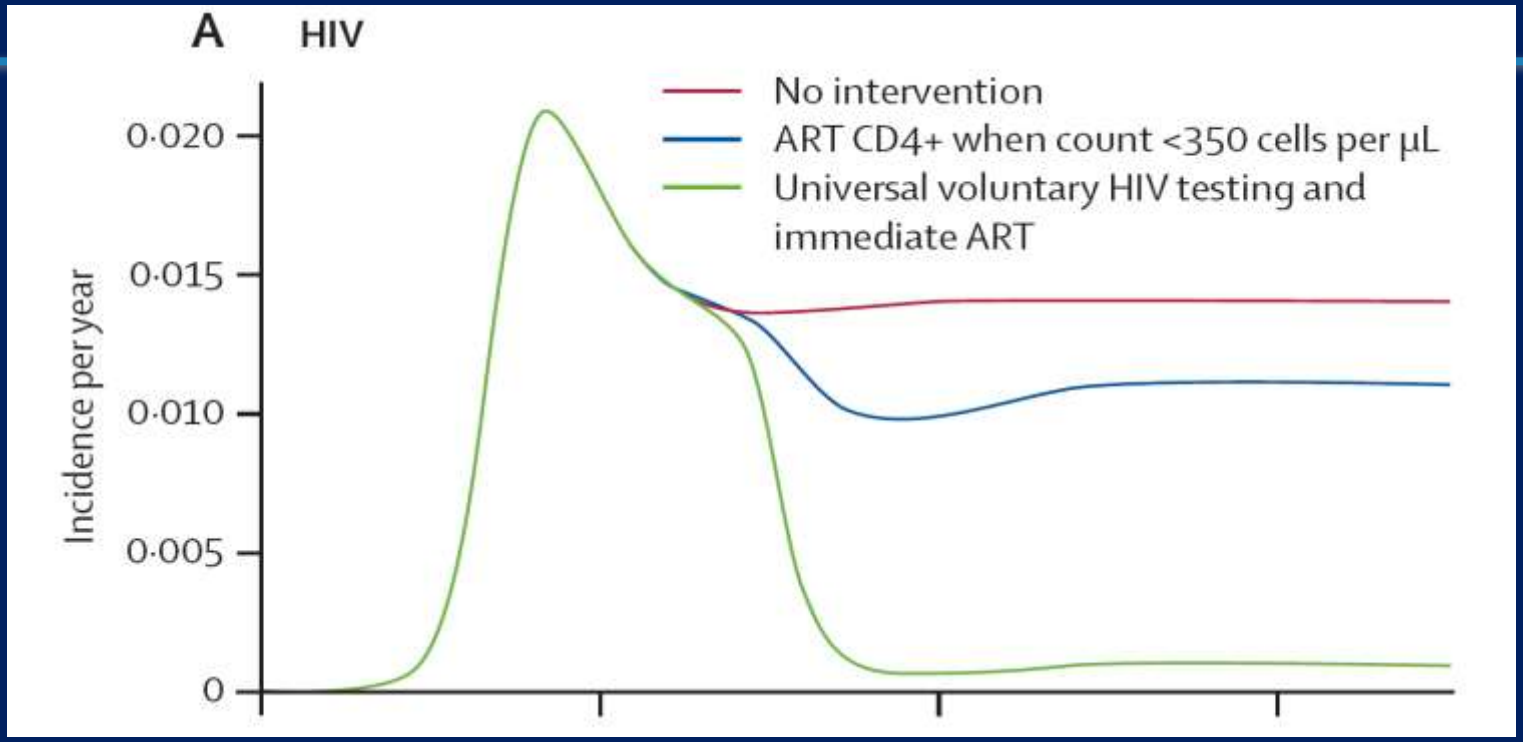
ATHENA National Cohort[2]



1. Moore RD, et al. Clin Infect Dis. 2007;44:441-446. Published by The University of Chicago Press. Copyright ©2009. University of Chicago Press. All rights reserved. http://www.journals.uchicago.edu/toc/cid/current.
2. Teiras L, et al. J Acquir Immune Defic Syndr. 2007;45:183-192. Reproduced with permission.

World Health Organization

ART as prevention



- Widespread testing, care, and early ART could have an effect on HIV incidence and survival

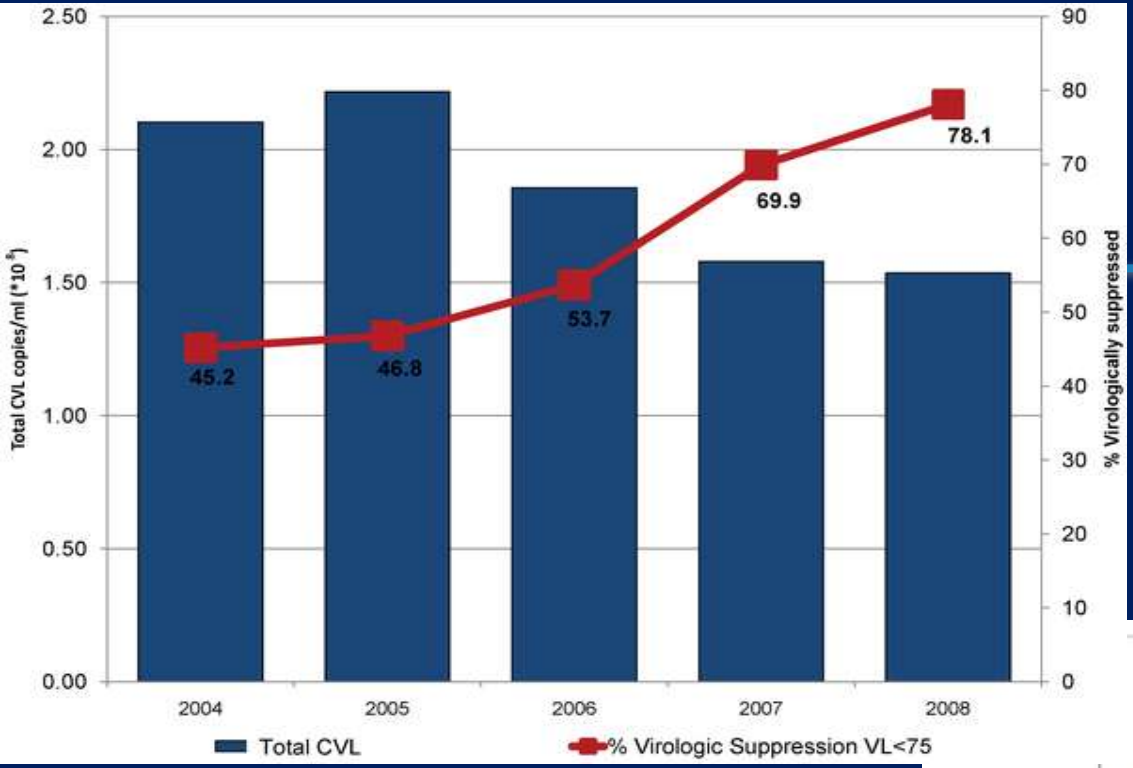
For discordant couples ART is critical long term prevention intervention

Granich *Lancet* 2008

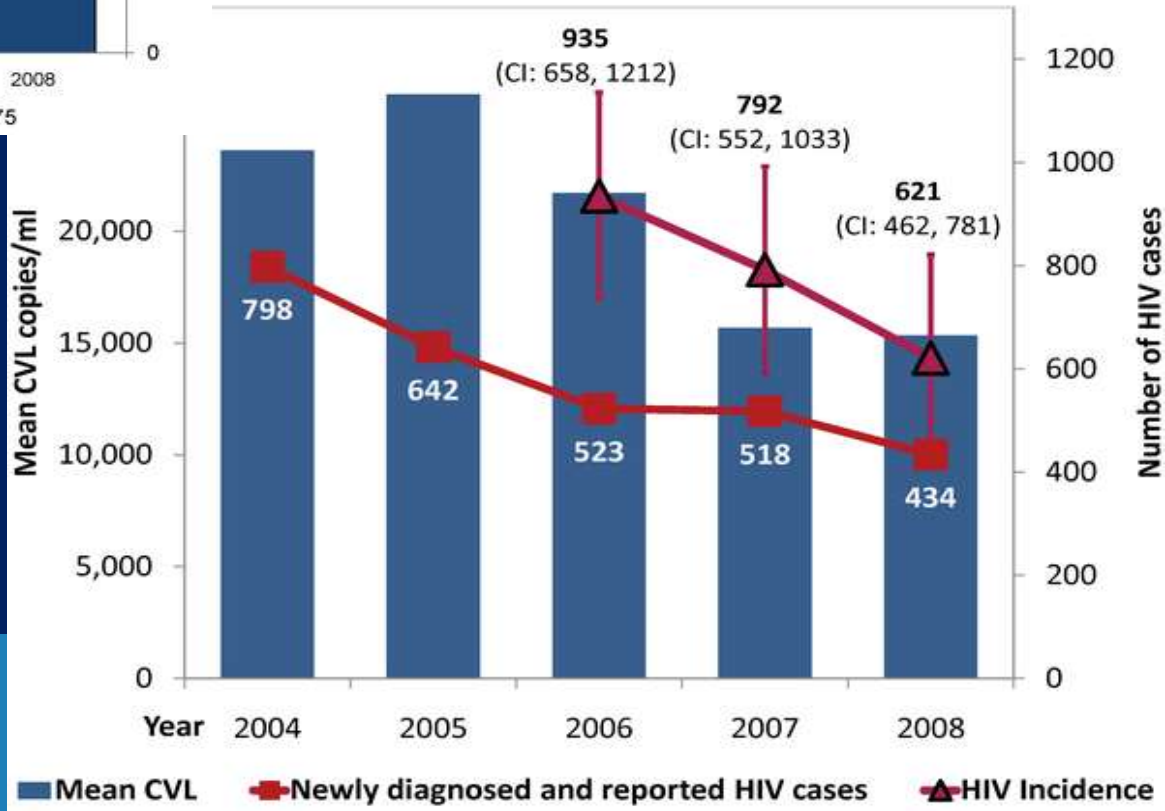
Acute phase

- Estimates range from 3-40% of transmissions in acute phase
- Data is largely drawn from 10 serodiscordant couples in Rakai cohort
- Little direct evidence using virological data given difficulty in determining infection and seroconversion
- Epidemiology matters—generalized epidemic surveillance data suggests that acute phase is not major driver of epidemic
- Opinion varies on impact on treatment as prevention programs

Community Viral Load and New HIV Cases in San Francisco County



n=12,512 unduplicated HIV-positive individuals

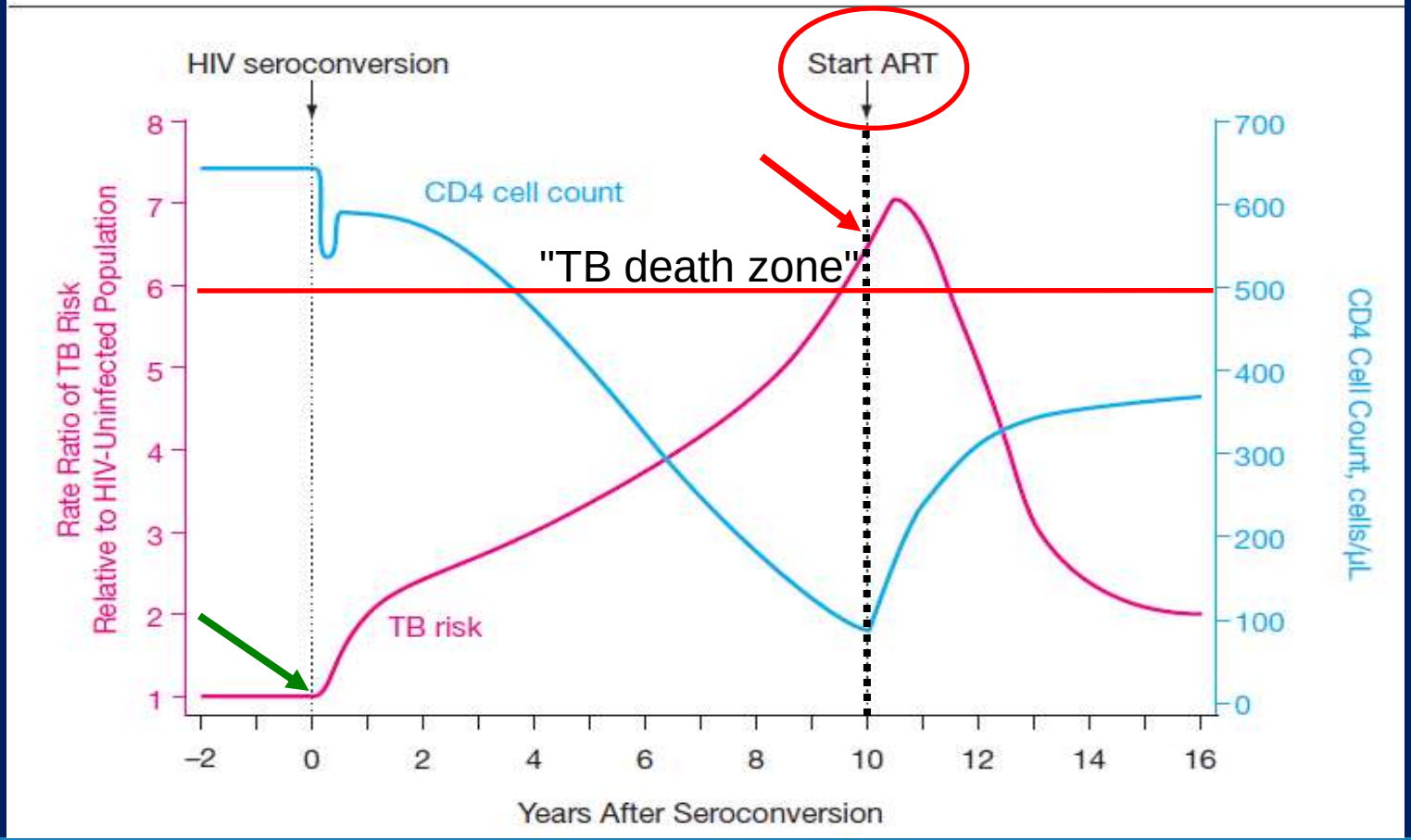


Das M, Chu PL, Santos G-M, Scheer S, Vittinghoff E, et al.
Decreases in Community Viral Load Are Accompanied by Reductions in New HIV Infections in San Francisco.
PLoS ONE 2010 5(6): e11068. doi:10.1371/journal.pone.0011068

CD4 level is associated with TB incidence: earlier start may decrease TB risk

Havlir, Getahun et al. 2008 JAMA 300(4):423-430

Figure. Schematic of Risk of TB and Change in CD4 Cell Count From Onset of HIV Seroconversion



Slide adapted by Dr. Abhishek Sharma

World Health Organization

Risk of non-AIDS morbidity and mortality

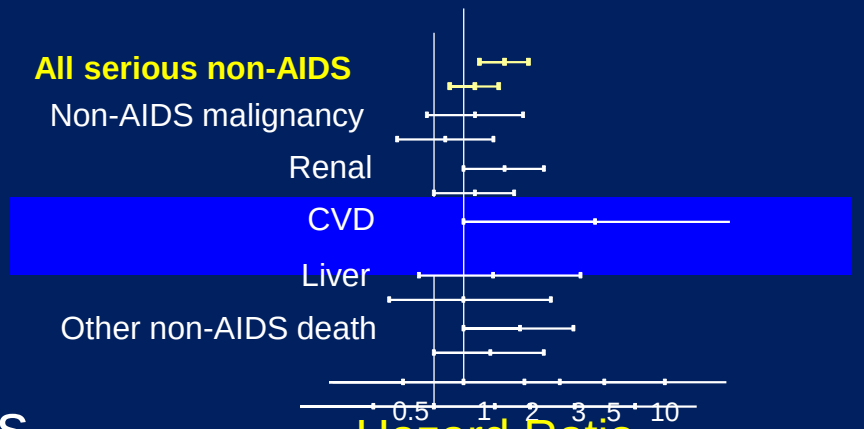
HIV may be associated with serious non-AIDS defining events

- Cardiovascular
- Renal
- Liver
- Non-AIDS malignancies

At higher CD4 counts non-AIDS events are much more common than AIDS events

Does ART use reduce risk of some serious non-AIDS events?

SMART Trial



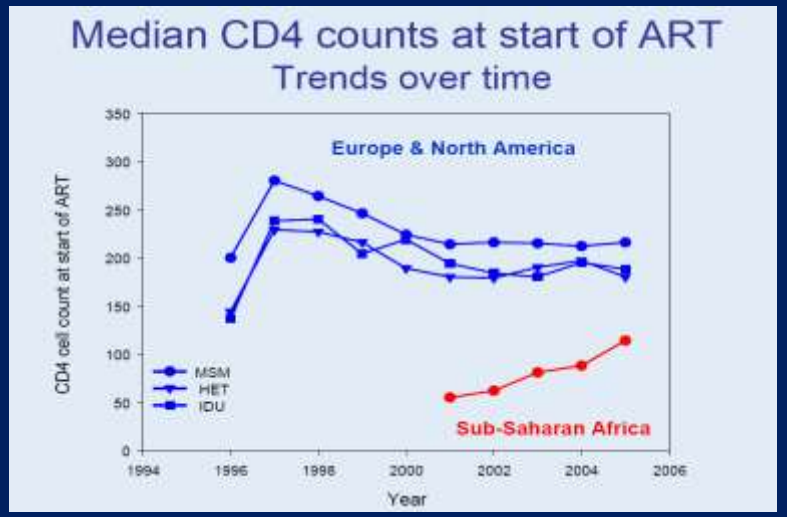
Hazard Ratio
Intermittent vs. continuous ART

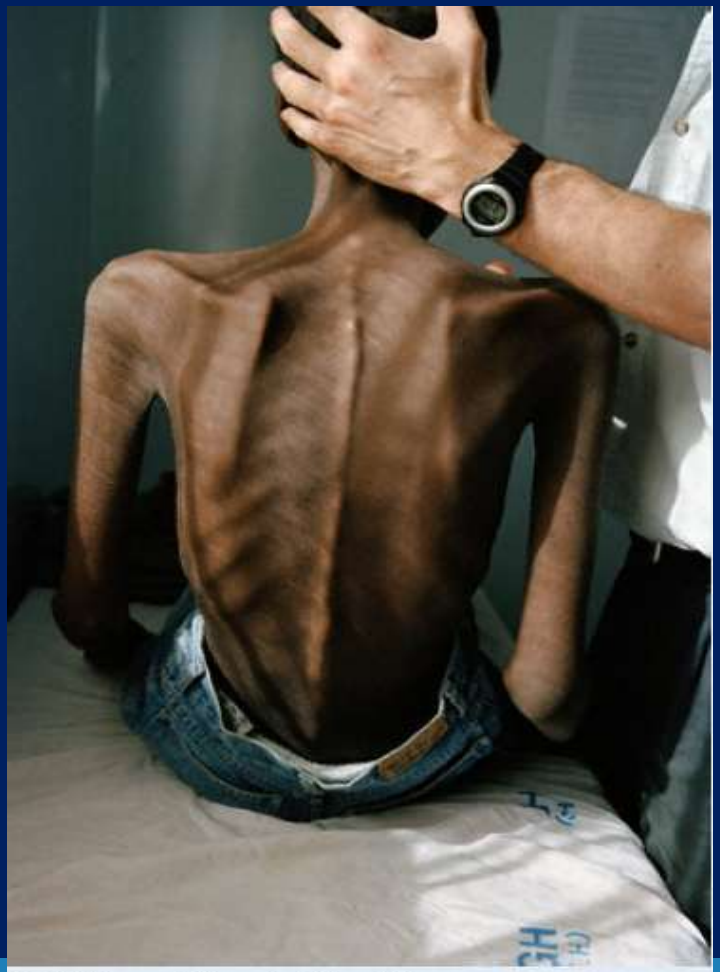
SMART Study Group, NEJM 2006 & Neaton et al, Current Opinion in HIV/AIDS 2008
Slide courtesy of A Phillips

World Health Organization

World Health Organization

Late initiation of ART and mortality





© Gideon Mendel/Corbis

Source: Egger M, CROI 2007

Treatment works: *Lazarus effect*

Concilia after 90 days of ARV treatment…

World Health Organization

Acknowledgements

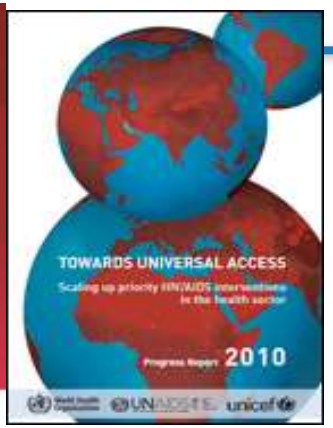
All HIV Department staff that

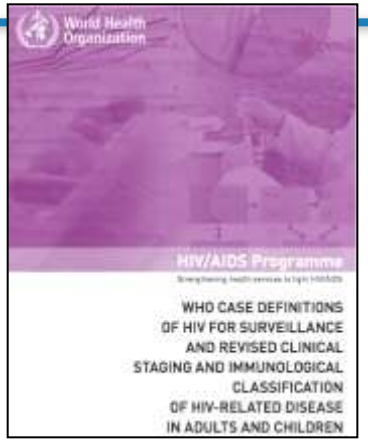
have contributed to production

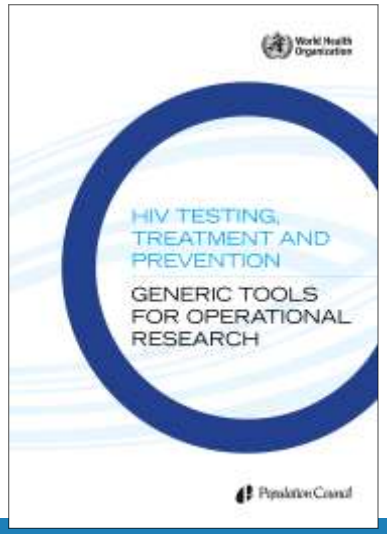
of slides and technical reports

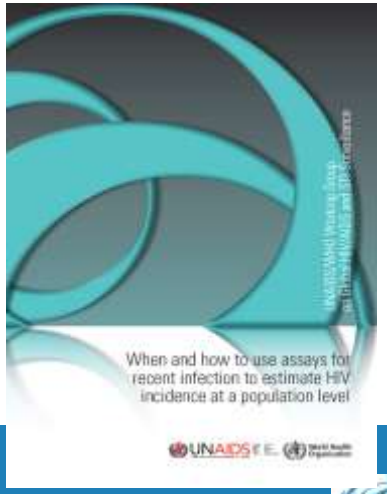
World Health Organization

Standard and Norms for HIV surveillance, care and treatment and global reporting



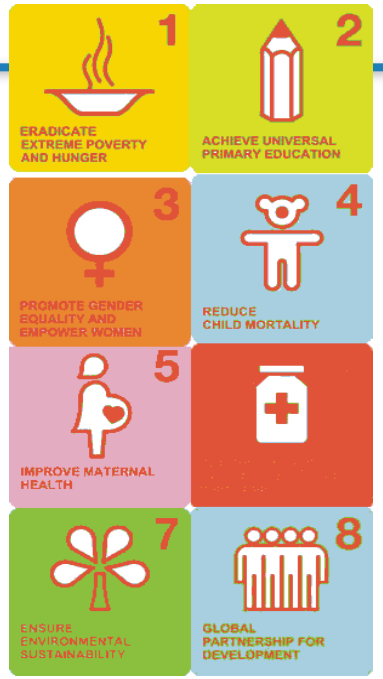


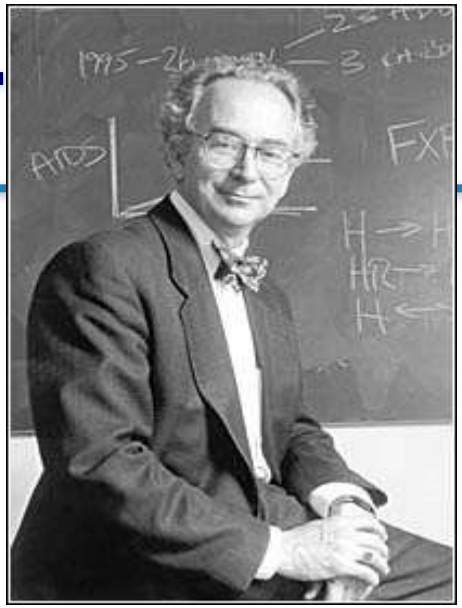




World Health Organization

Towards Universal Access.





World Health Organization

- "I want my leadership to be judged by the impact of our work on the health of two populations: women and the people of Africa."

- "Our greatest concern must always rest with disadvantaged and vulnerable groups. These groups are often hidden, live in remote rural areas or shantytowns and have little political voice."

Dr Margaret Chan

Director-General, WHO

World Health Organization

For further information

Dr Jesus M Garcia Calleja (callejaj@who.int)

World Health Organization
HIV/AIDS Department
20, Avenue Appia
CH-1211 Geneva 27
Switzerland
Email: hiv-aids@who.int