

HIV in 2013

Epidemiology of a pandemic Past, present and future

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S E G A L E N



Inserm

anRS

Agence nationale de recherches
sur le sida et les hépatites virales

HIV in 2013

Epidemiology of a pandemic

From Rock Hudson († 1985) ... to 9.7 million of ART-treated individuals worldwide (12 / 2012)



HIV in 2013 - Overview

Where are we now?

How did we get here?

Challenges

Biomedical prevention: the key to the future?

HIV in 2013 - Overview

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GLOBAL REPORT

UNAIDS report on the global AIDS epidemic 2013

Released September 2013
Available at <http://www.unaids.org>

Global estimates for adults and children in 2012

People living with HIV

35.3 million

[32.2 million – 38.8 million]

New HIV infections

2.3 million

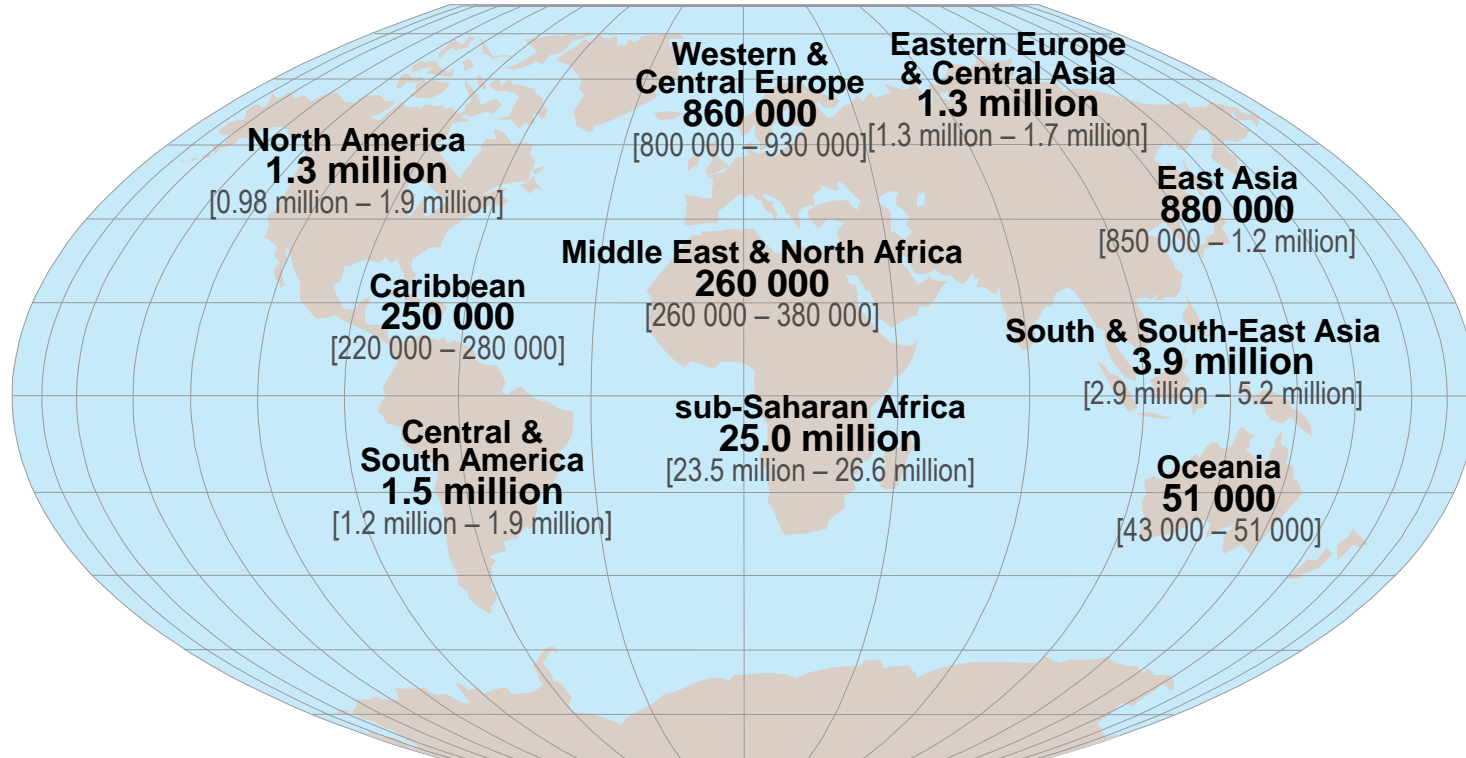
[1.9 million – 2.7 million]

Deaths due to AIDS

1.6 million

[1.4 million – 1.9 million]

Adults and children estimated to be living with HIV in 2012



Total: 35.3 million [32.2 million – 38.8 million]
mid-2010 estimate: 34 million (30.9 – 36.9)

Estimated number of adults and children newly infected with HIV in 2012



Total: 2.3 million [1.9 million – 2.7 million]

2011 estimate: 2.5 million (2.2 – 2.8)

Over 6 300 new HIV infections per day in 2012 worldwide

- About 95% are in low and middle income countries
- About 700 are in children under 15 years of age
- About 5 500 are in adults aged 15 years and older, of whom:
 - almost 47% are among women
 - about 39% are among young people (15-24)

Estimated adult and child deaths from AIDS in 2012



Total: 1.6 million [1.4 million – 1.9 million]

2011 estimate: 1.7 million (1.5 – 1.9)

HIV in 2013 - Overview

Summary of global statistics

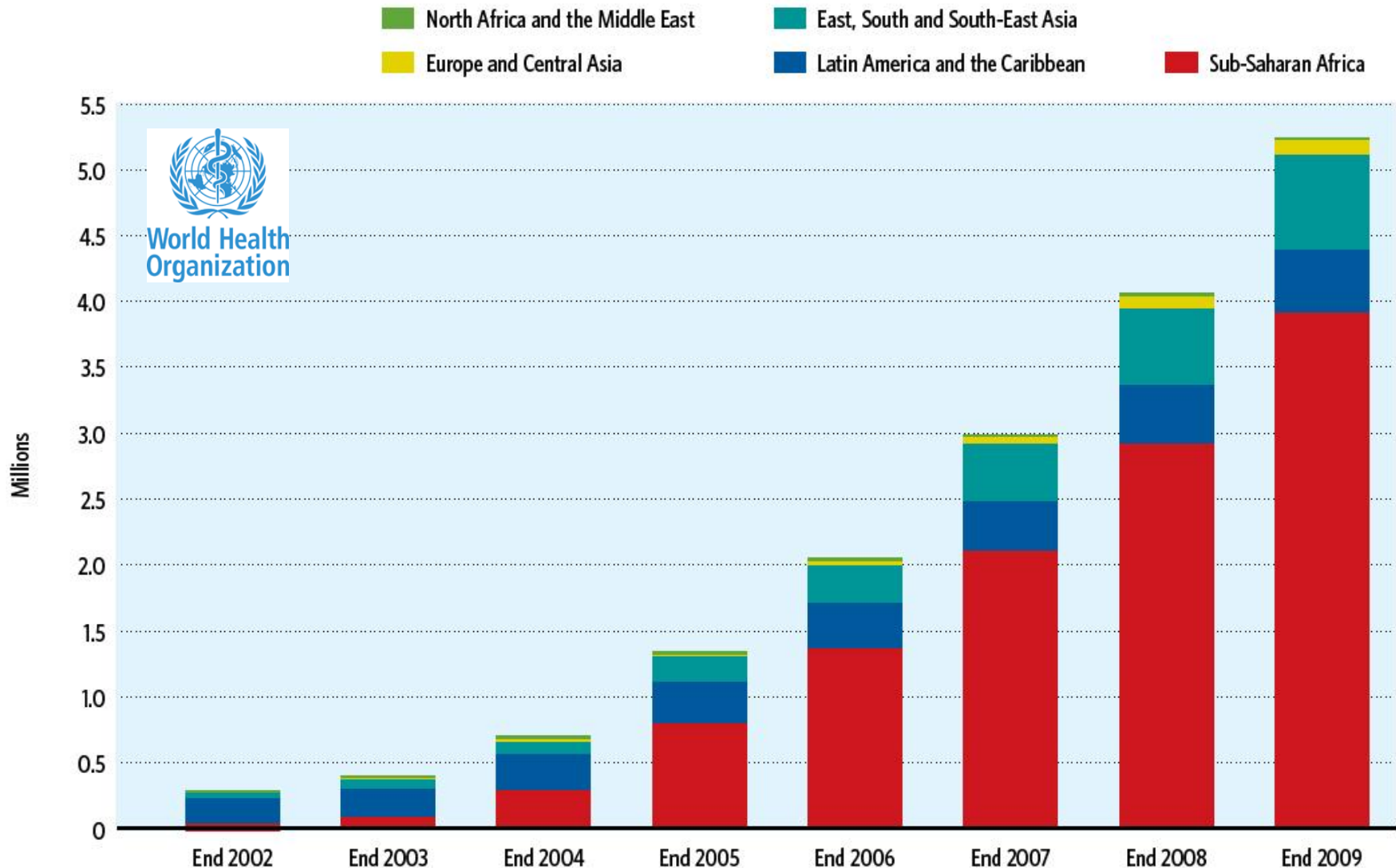
The HIV pandemic remains extremely dynamic and is not well controlled

HIV in 2013 - Overview

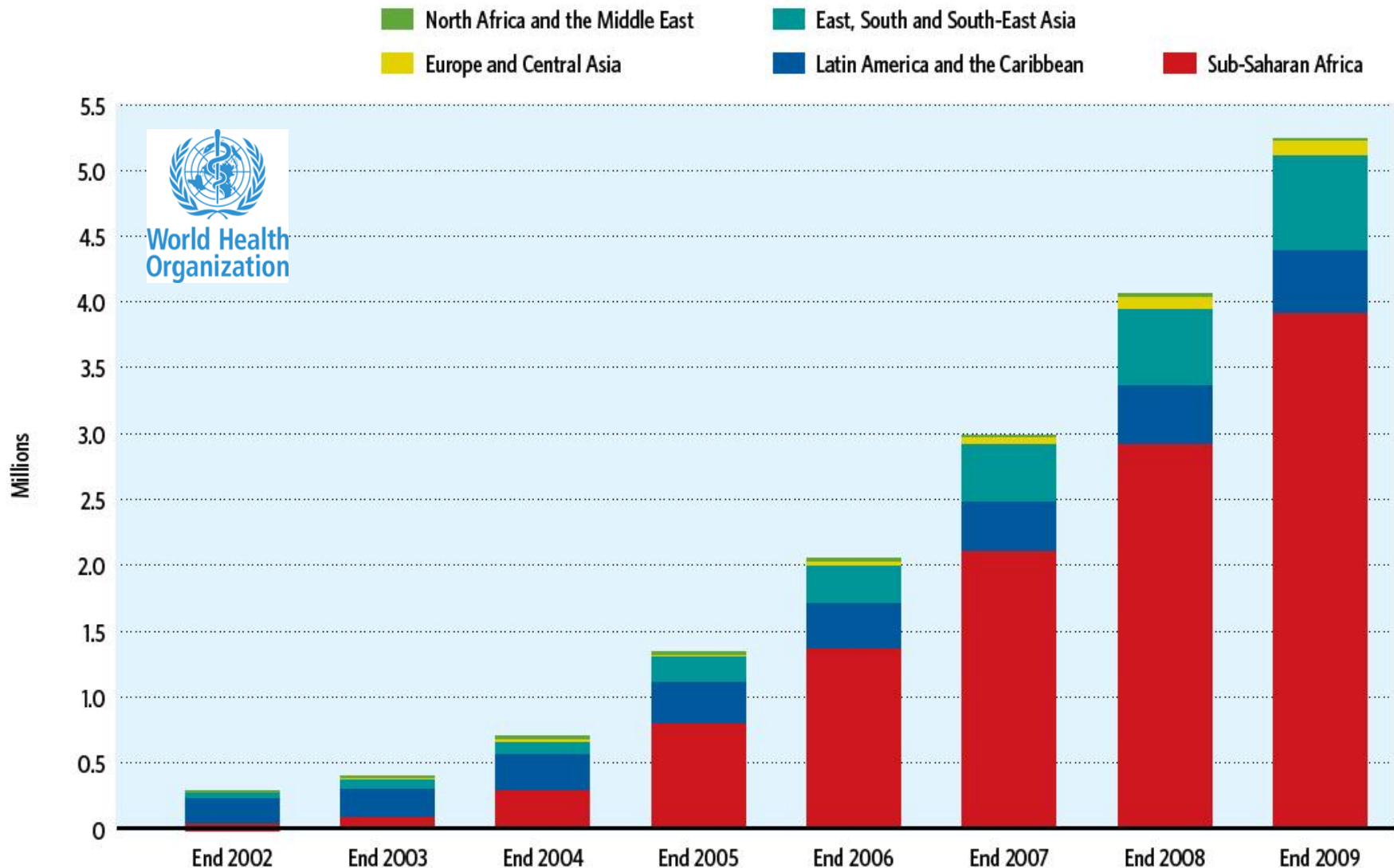
Where are we now?

**Antiretroviral treatment (ART):
The big and positive change
of the last decade**

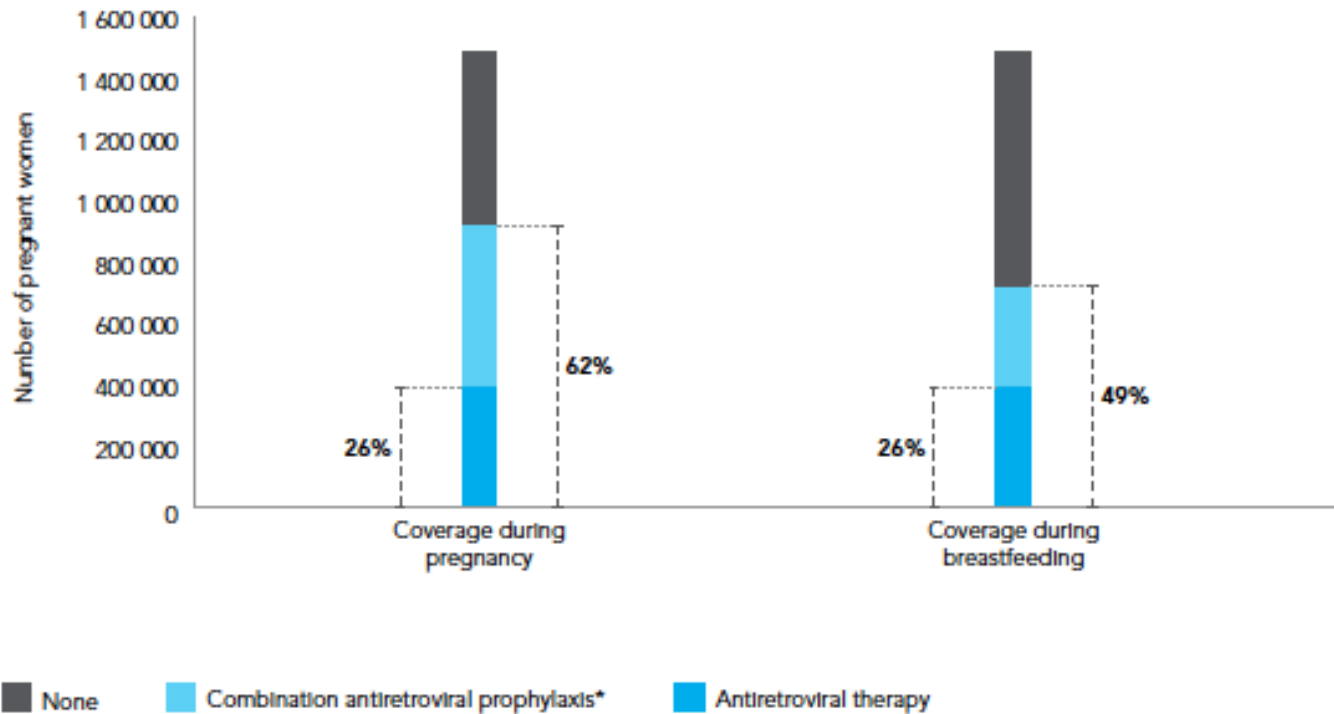
Number of people receiving antiretroviral therapy (ART) in low- and middle-income countries, by region of the world, 2002–2009



Number of people receiving antiretroviral therapy (ART) in low- and middle-income countries, by region of the world, 2002–2009 ... 9.7 million as of December 2012



Number and percentage of HIV-positive pregnant women in low- and middle-income countries who received antiretroviral medicine to prevent new HIV infections among children, during pregnancy and breastfeeding, 2012



Source: UNAIDS 2012 estimates

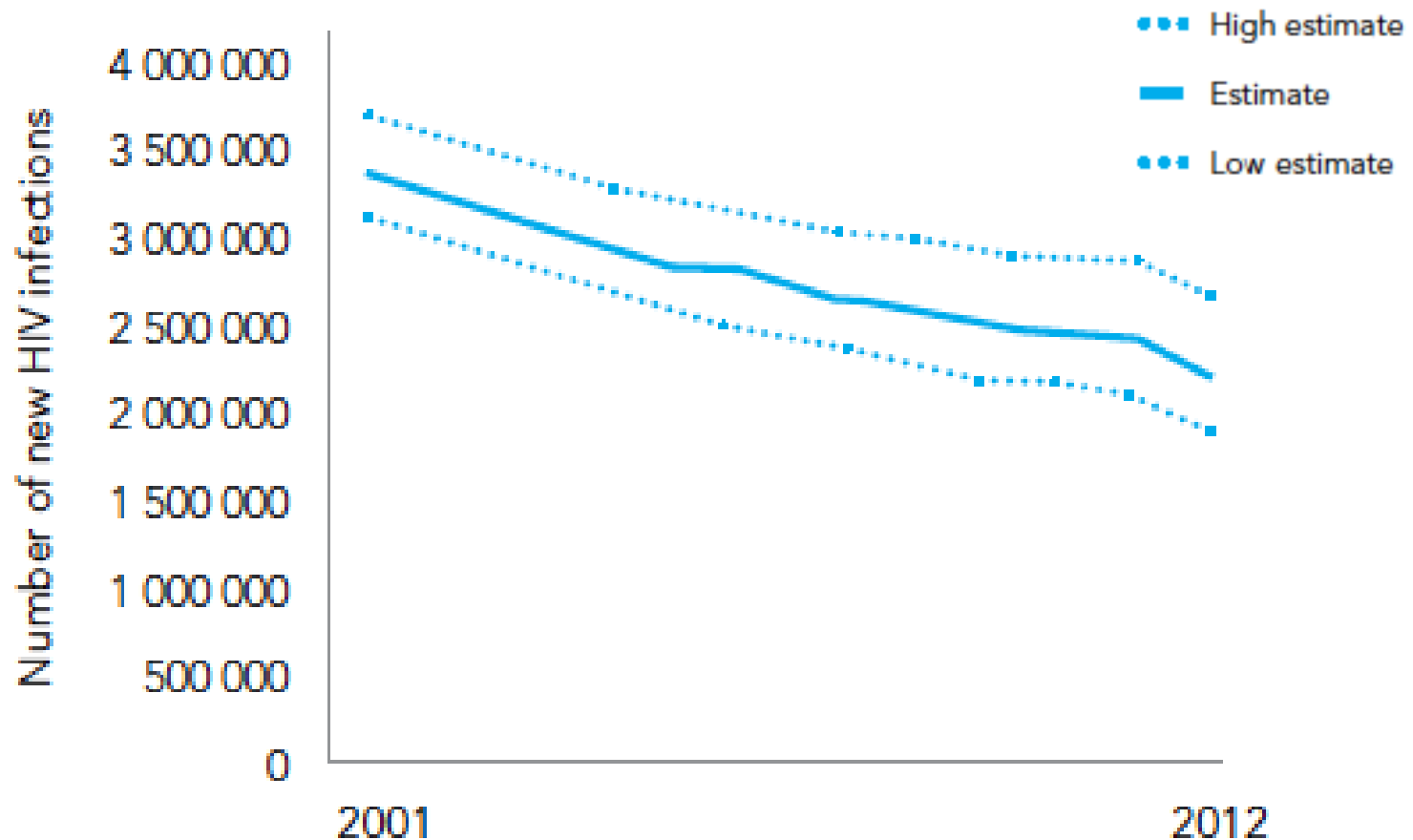
HIV in 2013 - Overview

Where are we now?

The trends are encouraging

Global estimates: A downward trend in HIV incidence (2001 – 2012)

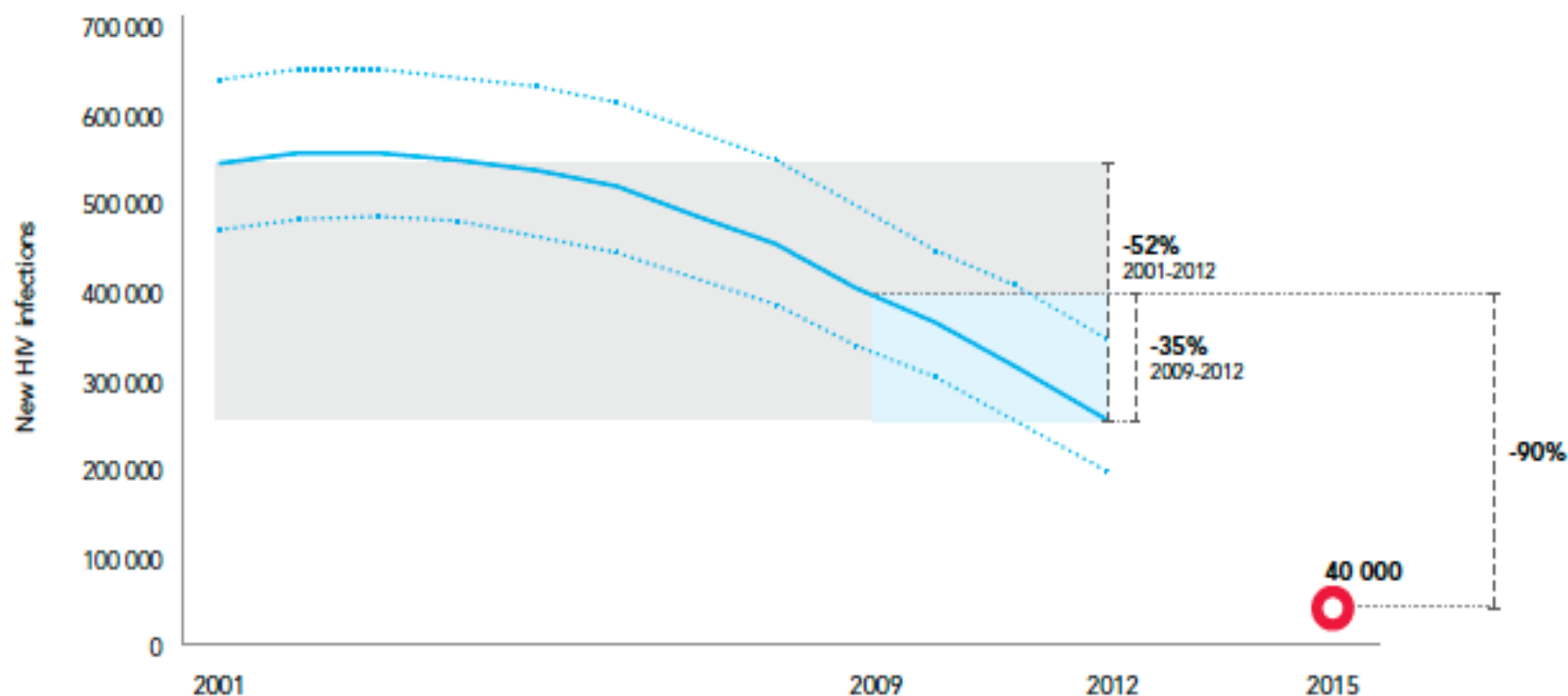
NEW HIV INFECTIONS, GLOBAL, 2001–2012



HIV incidence in France

- **7 000 to 8 000 new contaminations per year (2004-2008)**
- **The epidemic remains active, especially among MSM (incidence 1% per year)**
- **Testing and identification of new HIV+ diagnoses is insufficient to control the epidemic**

Number of new HIV infections among children in low- and middle-income countries, 2001–2012 and 2015 target



Source: UNAIDS 2012 estimates

••• High estimate

— Estimate

••• Low estimate

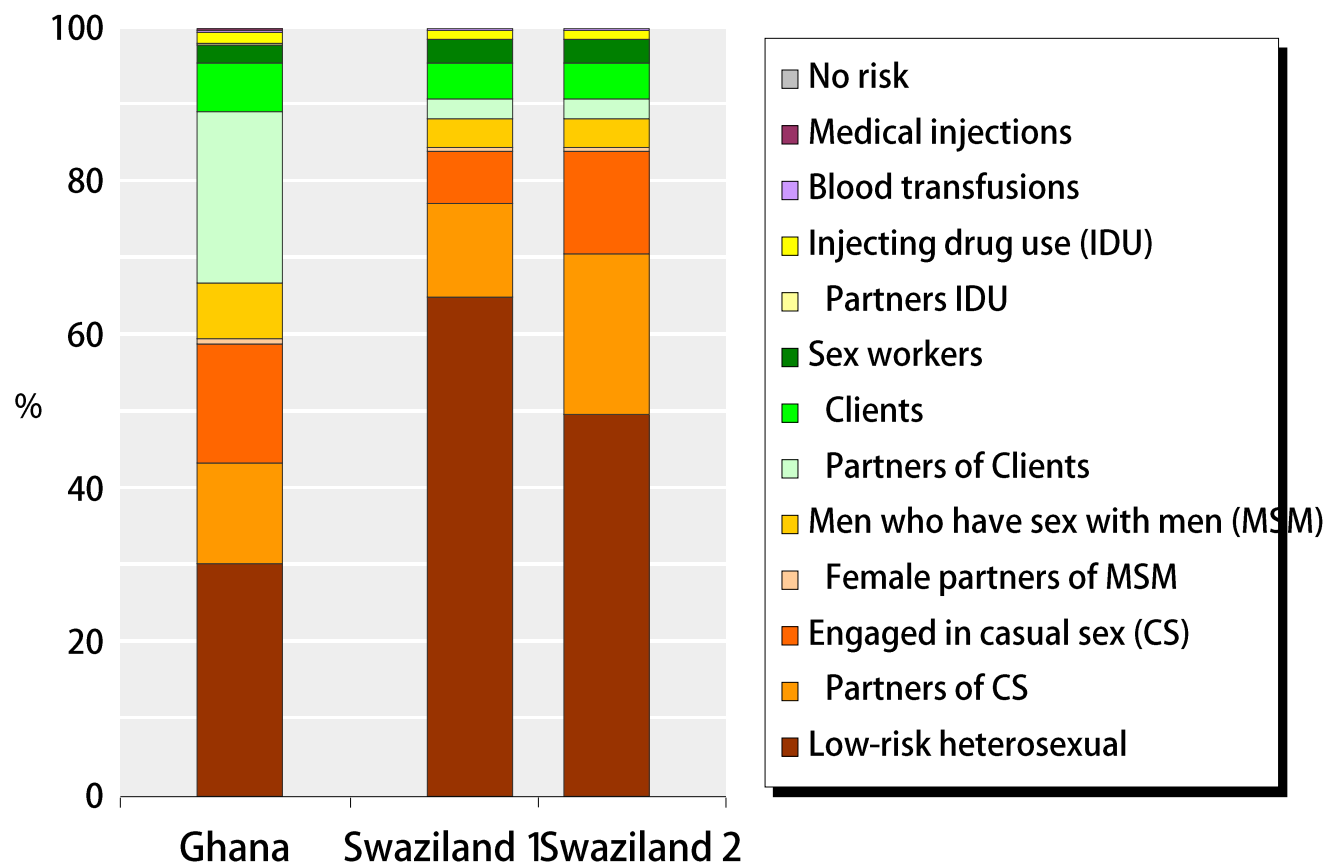


The trends of the epidemic in sub-Saharan Africa remains a major preoccupation

Number of people living with HIV	2012	25.0 million [23.5 million – 26.6 million]
	2001	19.7 million [18.3 million – 21.2 million]
Number of new infections	2012	1.6 million [1.4 million – 1.8 million]
	2001	2.3 million [2.0 million – 2.5 million]
Number of children newly infected	2012	230 000 [200 000 – 280 000]
	2001	460 000 [260 000 – 640 000]
Number of AIDS-related deaths	2012	1.2 million [1.1 million – 1.3 million]
	2001	1.4 million [1.2 million – 1.7 million]

Distribution of new infections by mode of exposure in Ghana and Swaziland, 2008

The “Know your epidemic” concept



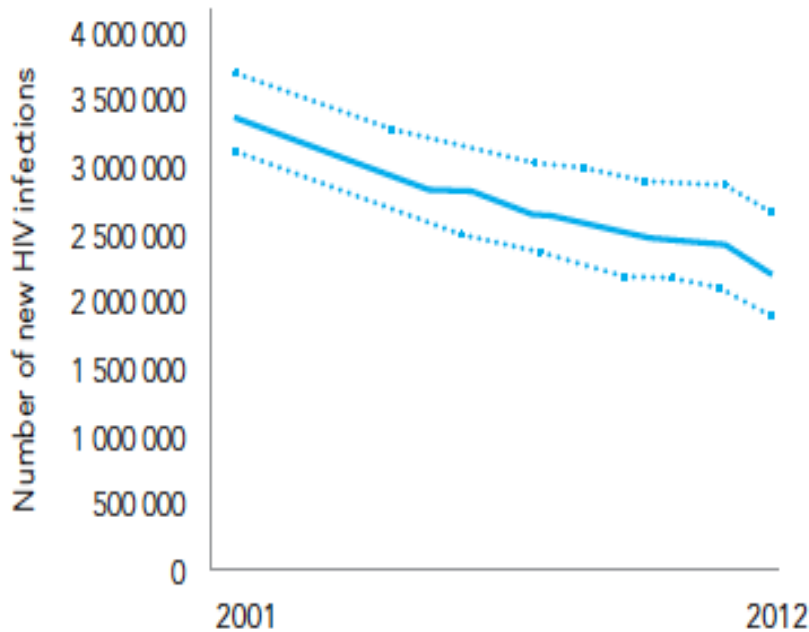
Note: sensitivity analysis for Swaziland used different data sources.

Sources: Bosu et al. (2009) and Mngadi et al. (2009).

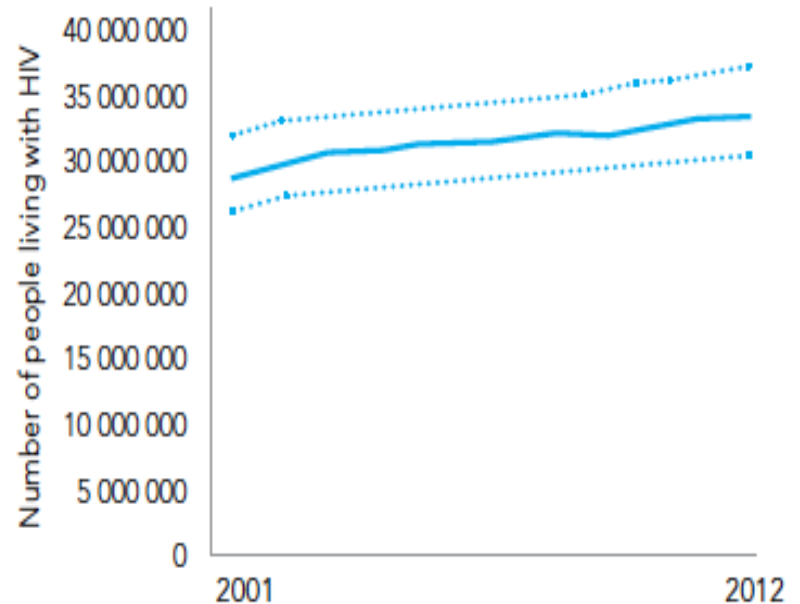
Figure 3

Global estimates: The somewhat “paradoxical effect of ART (2001 – 2012)

NEW HIV INFECTIONS, GLOBAL, 2001–2012



PEOPLE LIVING WITH HIV, GLOBAL, 2001–2012



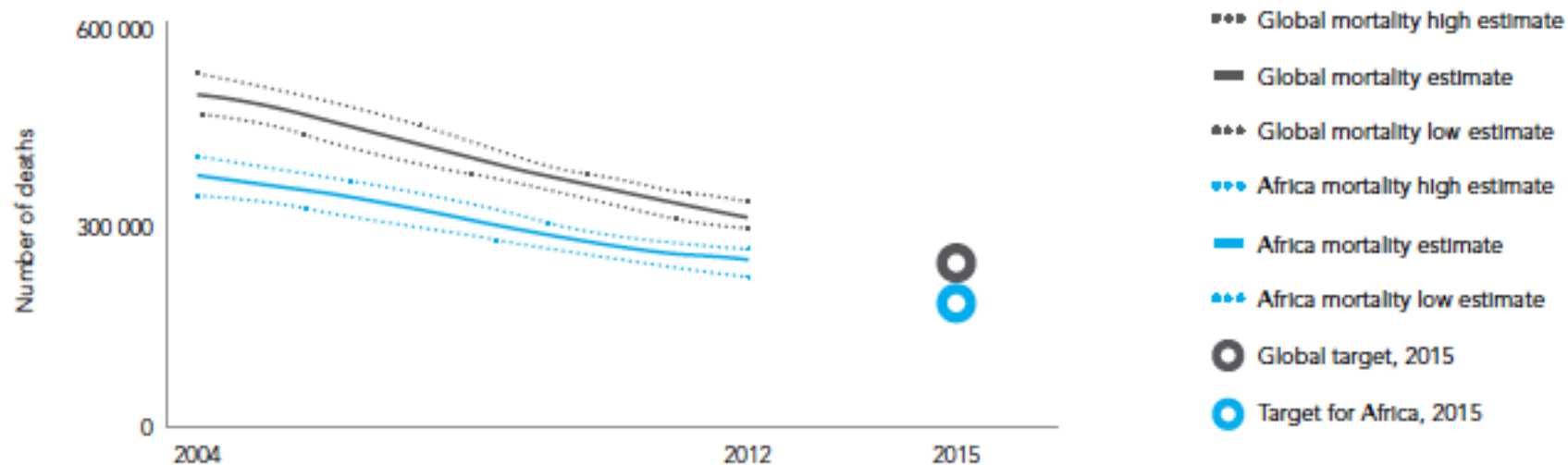
- High estimate
- Estimate
- Low estimate



HIV patterns in France - Summary

- **Incidence relatively constant from almost a decade**
7 000 – 8 000 par an
- **Mortality**
< 1 000 deaths / year (Source: Mortalité 2010 survey)
- **2010 prevalence: 149 000 (134 000 - 165 000) people living with HIV/AIDS**
28 800 HIV-infected individuals are currently unaware of their HIV+ serostatus and 9 600 are aware but are not in care

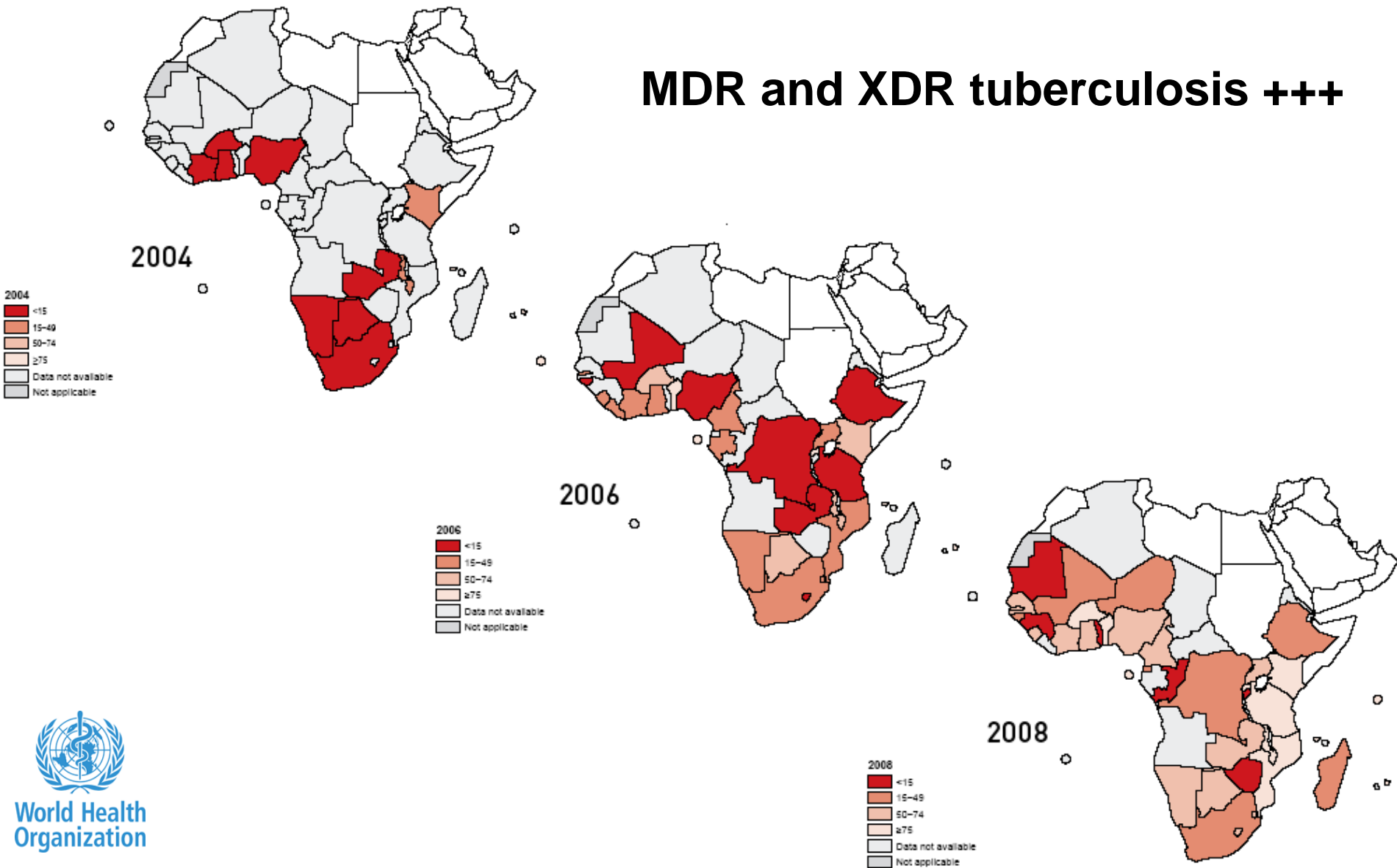
Estimated number of tuberculosis-related deaths among people living with HIV, globally and for Africa, 2004–2012



Source: Global tuberculosis report 2013. Geneva, World Health Organization, 2013 (detailed country estimates are in the WHO report).

Rates of HIV testing among TB patients in WHO African region, 2004–2008

MDR and XDR tuberculosis +++



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Biomedical prevention: the key to the future?

HIV in 2013 - How did we get there?

June 1981, San Francisco, Los Angeles, Atlanta, Paris, ...

June 1983, Paris

Décembre 1997, Abidjan

Juillet 2000, Durban

Juillet 2002, Barcelone

2003, Beginning of the « 3 by 5 » initiative



... and 9.7 million of HAART-treated individuals worldwide at the end of 2012 (Source: WHO & UNAIDS Septembre 2013)

HISTORY (1): 1981 - 1983

- **5 June 1981**: MMWR (Morbidity and Mortality Weekly Report of US Centers for Disease Control)
- Michael Gottlieb et al
- *Case report: [Pneumocytis Pneumonia - Los Angeles; 1981, 30;21]*
 - Los Angeles : 5 cases of severe pneumonia
 - MSM (29-36 years)
- **1983** : Identification of a new human retrovirus humain in the lymph node of a French patient suffering from AIDS: LAV (*Lymphadenopathy Associated Virus*) or HTLV3 (*Human T-Cell Leukemia Viruu*) by Luc Montagnier et Françoise Barré-Sinoussi (Institut Pasteur) – Will become **HIV-1** ... and 25 years later a **Nobel Prize**

HISTORY (2): 1982 – 1985 (a)

- **1982-1985**, slow mobilization in France and elsewhere:
 - Emergence of activist groups becoming NGOs (AIDES, Act Up, ...)
 - 09/1985: According to a French poll, 87% of General Practitioners think that the fear of AIDS is exaggerated
 - **No understanding of the seriousness of the situation on the African continent+++**
- **Early 1985**: 2 screening tests for HIV antibodies are marketed:
 - *HTLV-III EIA, Abbott*
 - *Elavia, Diagnostics Pasteur*

HISTORY (3): 1982 – 1985 (b)

- Hesitations to put **AIDS under surveillance** (WHO)
« reported individual cases »
 - . 408 (begin 1982)
 - . 12 174 (end 1984)
- 1st International **Conference** on AIDS, Atlanta, 1985
- First **clinical definitions of AIDS** proposed for surveillance purposes in developed countries and in a simplified manner for the rest of the world (Bangui, Central African Republic)
- Subsequent revisions to come until 1992

HISTORY (4): 1985 - 1989

- **1985:** Systematic **screening of blood donations** (August 1985 in France – The « Contaminated Blood crisis »)
- **1986:** **AIDS** becomes a disease for **mandatory reporting** in most countries (WHO)
- **1987:** Major steps for **prevention** in France: condoms can be advertised, syringes can be sold freely in pharmacies and are advertised publically, creation of coordinating centers for HIV care (**CISIH**), Azidothymidine (**AZT**) is marketed
- **1988:** **Anonymous Counselling & Testing (C&T)** operationalized
1st World AIDS Day (December 1st)
- **1989 :** Creation of independant agencies in France to complement Ministry of Health administration (**ANRS**, AFLS)

HISTORY (5): 1985 onwards

Sero-surveillance is developed

Objective: descriptive epidemiology of HIV infection

- **Unlinked anonymous sentinel surveillance**
- Techniques commonly used in industry and business are introduced for surveillance purposes (Lot Quality Assurance Sampling – LQAS)
- National estimates of HIV prevalence and projections are regularly produced (Spectrum®)

HISTORY (6): 1991 - 1995

- **Scientific uncertainties and doubts**
- The fears reappear in the populations: Is AIDS caused by a virus? Should HIV screening be mandatory? Should HIV-infected people be put aside in the society? Should they travel freely?...
- **The epidemic is now clearly a pandemic and lower-income countries are the most heavily affected ones on all continents**
- UNAIDS is created on December 1st, 1995
- Prevention (*ABC*) is THE only solution

HISTORY (7): 1996 - 1998

- **Highly Active Antiretroviral Therapy (HAART) emerges!!!**
(Vancouver, July 1996):
 - Triple drug combinations (including protease inhibitors then other compounds)
 - **The face of the epidemic is dramatically changing in the industrialized world in the following year**
 - Should HAART be provided selectively?
 - What is the meaning of a « undetectable » plasma viral load?
- **Prevention of mother-to-child transmission with antiretrovirals** is the first success story of biomedical prevention in the developed then in the developing world

HISTORY (8): 1998 - 2004

- The epidemic moves rapidly throughout Africa, Asia and **as feared in Eastern Europe**
- First-generation of HAART induces problems of tolerance, adherence and viral resistance in Europe, North America and Australia
- **HIV is becoming a chronic disease with the need for a treatment for life**
- Abidjan (Decembre 1997) and Durban (July 2000) : The turning tide for treatment in lower-income countries
- **« Treatments are in the North, patients in the South »**
- **=> UNGASS (Septembre 2001)**
- Barcelona (July 2002) : Haïti (Paul Farmer), MTCT-Plus Initiative
- Geneva, Paris (2003):
 - WHO pilot programmes: Senegal, Côte d'Ivoire, Chile, VietNam
 - **The health economists argue for HAART**
 - The « 3 x 5 » WHO initiative (the beginning of scaling up)
 - First international guidelines for HIV care and treatment of adults

HISTORY (9): The first decade of the 21st century – 2001 - 2010 (begin)

- The AIDS statistics are now routinely collected but their quality has not always improved, especially in lower-income countries
- **The relevance of the AIDS statistics is becoming highly questionable in industrialized countries**
- **The need for monitoring treatment patterns and outcomes (cohorts, longitudinal data bases) in the North and in the South**
- 2nd-generation HIV surveillance (epidemiology and behaviors) in lower-income countries
- **Mandatory reporting of HIV infection introduced in industrialized countries**

History (10): The first decade of the 21st century (ctd)

- The progression of the pandemic remains a major concern
- **The « apparent » control in industrialized countries:**
 - HAART is commonly started late
 - Treatment for life is now conceivable
 - ... but accelerated ageing
 - The prevention challenges for the new generations (MSM, IDUs, FSW, populations living in precarious conditions, ...)
 - A public health priority but less and less a societal concern (prevention)

History (11): The first decade of the 21st century (end)

- The overall « relative » improvement of the situation in lower-income countries, and the success in some countries (Brazil, Rwanda, Thailand, Cambodia):

WHO: 2006, public health approach; 2009, Traitement & Prevention

PEPFAR (US) = the first attempt to make scaling up possible

The Global Fund: not only HIV/AIDS but also tuberculosis and malaria

The preference for generic drugs

PMTCT and pediatric HIV treatment, new players: EGPAF, Clinton Foundation

The role of philanthropy (Bill & Melinda Gates)

(Present) history: 2011 – 2013 (begin)

- **The economic crisis is still around us ...**
- **Substantial scientific progress has been recently achieved:**
 - New ARV drugs, new ARV combinations
 - Medical male circumcision
 - The first vaccin partially effiacious (Finally!!!) !)
 - Microbicides may work, PreP may work, Treatment as Prevention (TasP) will work

(Present) history: 2011 – 2013 (end)

- National programs report successes ... and failures
- Predictable bottlenecks: programme dropouts, 2nd ligne regimens, start treating more persons and much and much earlier
- Sustainability and adaptation (task shifting, decentralization) at country level
- How to sustain the national and international commitment?
- **A public health priority and a worldwide emergency (For how long???)**



The NEW ENGLAND JOURNAL *of* MEDICINE

Perspective
AUGUST 23, 2012

The Beginning of the End of AIDS?

Diane Havlir, M.D., and Chris Beyrer, M.D., M.P.H.

The Economist

JUNE 4TH-10TH 2011

Economist.com

The trap for Turkey

Wall Street's plumbing problem

Lady Gaga, Mother Teresa and profits

Brazil's boiling economy

The farce that is FIFA

The end of AIDS?



**How 5 million lives have
been saved, and a plague
could now be defeated**





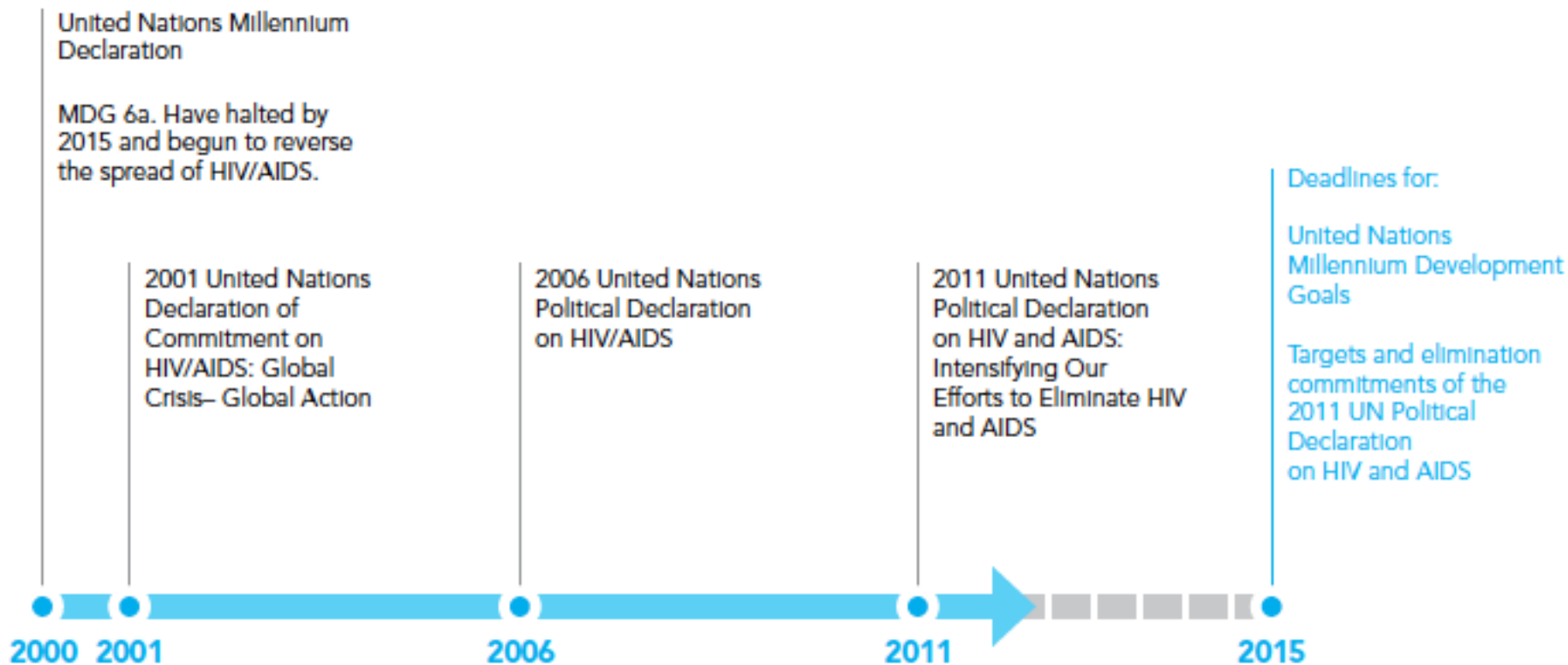
<http://www.c2ea.org>

The Campaign to End AIDS (C2EA) is a diverse, exciting coalition of people living with HIV & AIDS, their advocates and their loved ones. Together, we're demanding that our leaders exert the political will to stop the epidemic, in the U.S. and abroad, once and for all.

VOTE TO 
END AIDS

<http://www.unaids.org/en/resources/campaigns/votetoendaids>

On the road to the Millenium Development Goals (MDGs)



HIV in 2013 - How did we get here?

(Summary of the last 12 years)

- A clear and sustained (?) financial commitment**
- The formulation of public health guidelines (last revision 2013)**
- An increasing access and growing use of HIV Counselling and Testing services**
- Investment and reform of health infrastructures and personnel (task shifting)**
- Organizing and adapting care for this chronic disease: eMTCT, tuberculosis, family-centered approach**

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HIV in 2013 - The financial commitment

18.9 billion USD in 2012 (+ 10% in one year)



Investing in our future

The Global Fund

To Fight AIDS, Tuberculosis and Malaria

*France 2nd contributor after USA,
... closely followed now by UK*

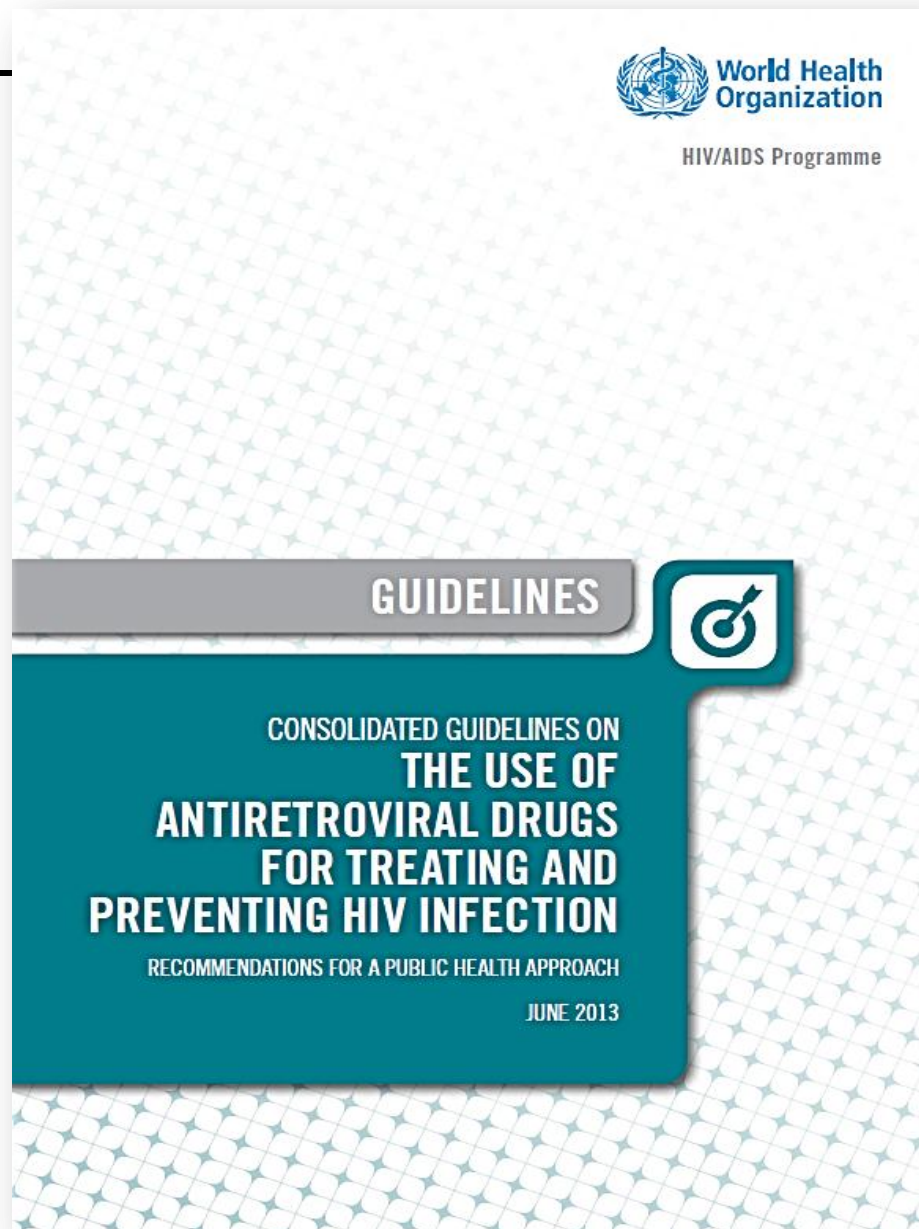


Ensemble pour une **S**olidarité **T**hérapeutique **H**ospitalière **E**n **R**éseau

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International guidelines for a public health approach are available and regularly updated



When to start ART: Consequences of the evolving recommendations

Estimated millions of people eligible for ART in lower & middle-income countries in 2011

11

CD4 \leq 200

Recommended
Since 2002

32

CD4 \leq 350

+
TB/HIV
HBV/HIV

15

CD4 \leq 350

+
Expanded CD4
independent
conditions

23

CD4 \leq 500

25

“Test and treat”

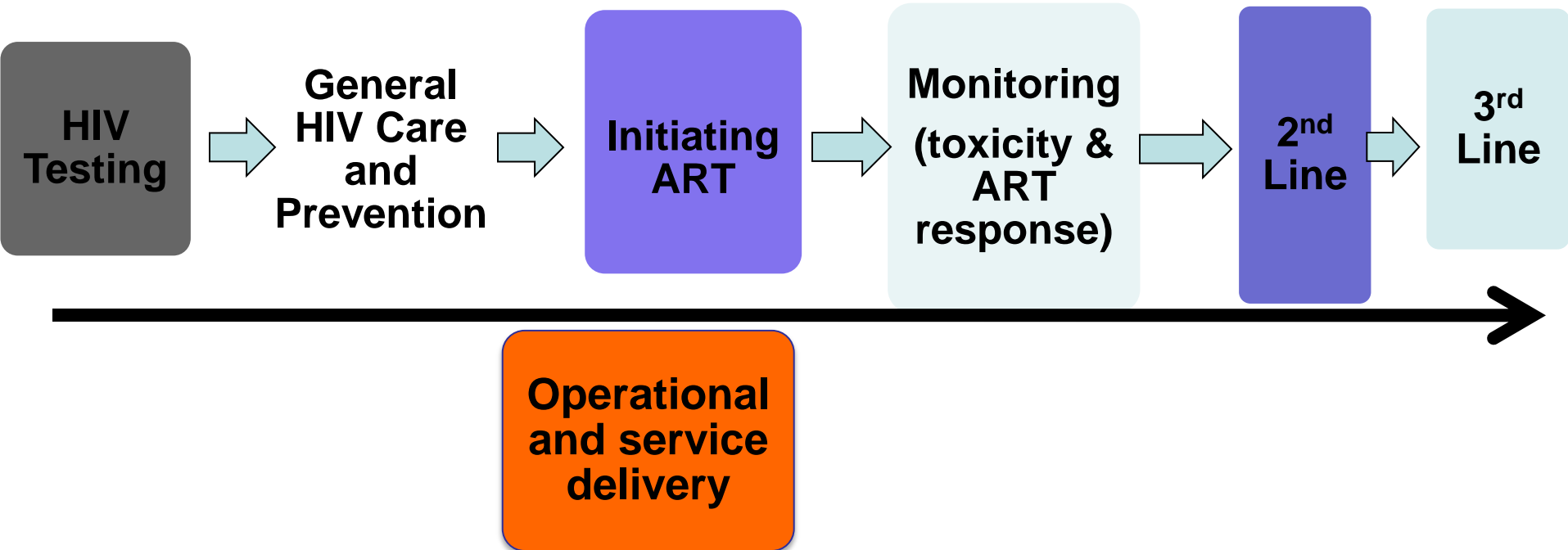
All HIV+

ART regardless of CD4 count for:

- HIV-SD couples
- Pregnant women

2013 WHO guidelines

Consolidation along the continuum of care

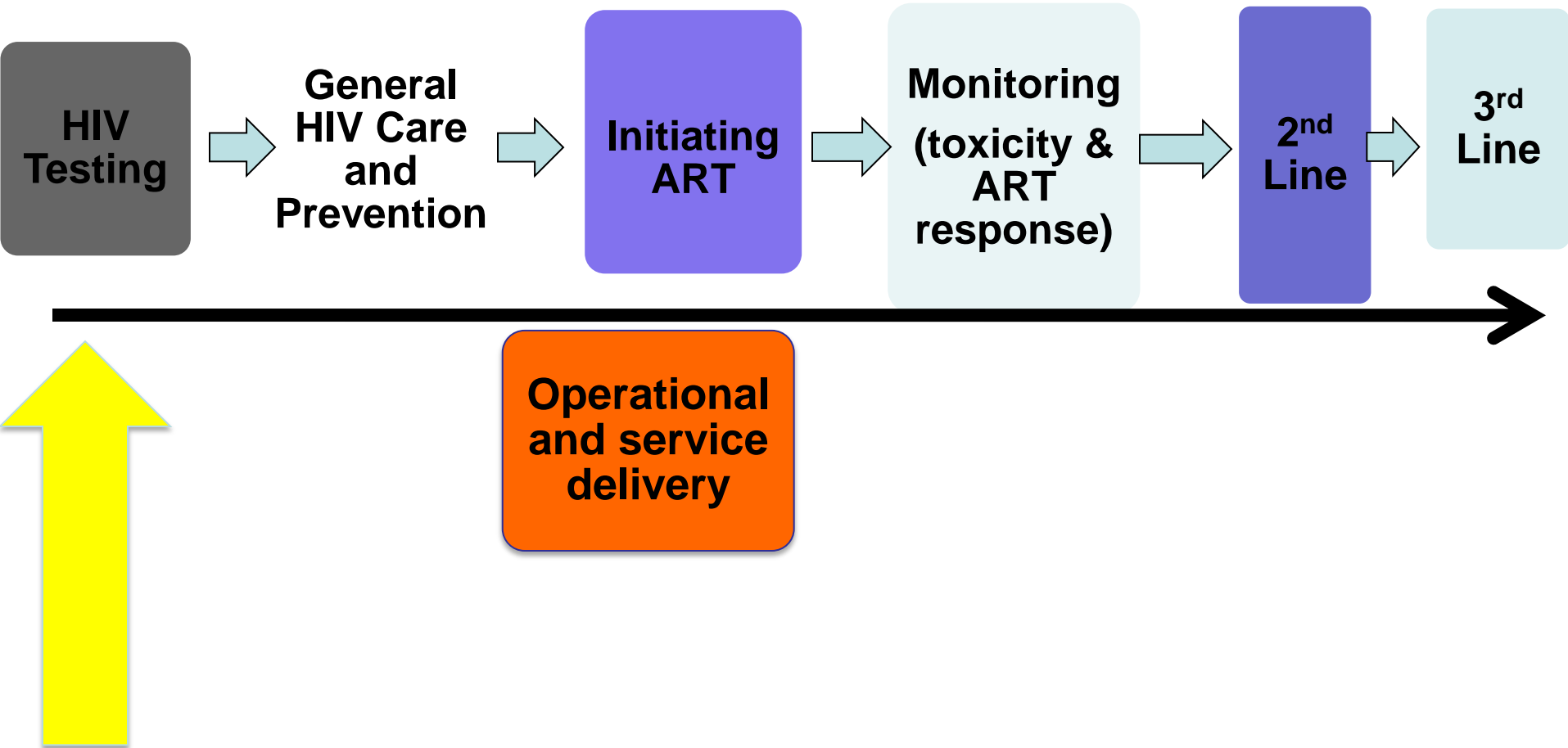


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2013 WHO guidelines

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HIV counselling & testing (C&T): How?

- **Provider-initiated C&T systematic review: wide variation and mixed results in identifying previously undiagnosed individuals (Roura M. AIDS, 2013)**

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- Provider-initiated C&T systematic review: wide variation and mixed results in identifying previously undiagnosed individuals (Roura M. AIDS, 2013)
- **Home-based C&T systematic review: High uptake of testing (88%) and of delivery of test result (77%) (Sabapathy K. PLoS Med, 2012)**

HIV counselling & testing (C&T): How?

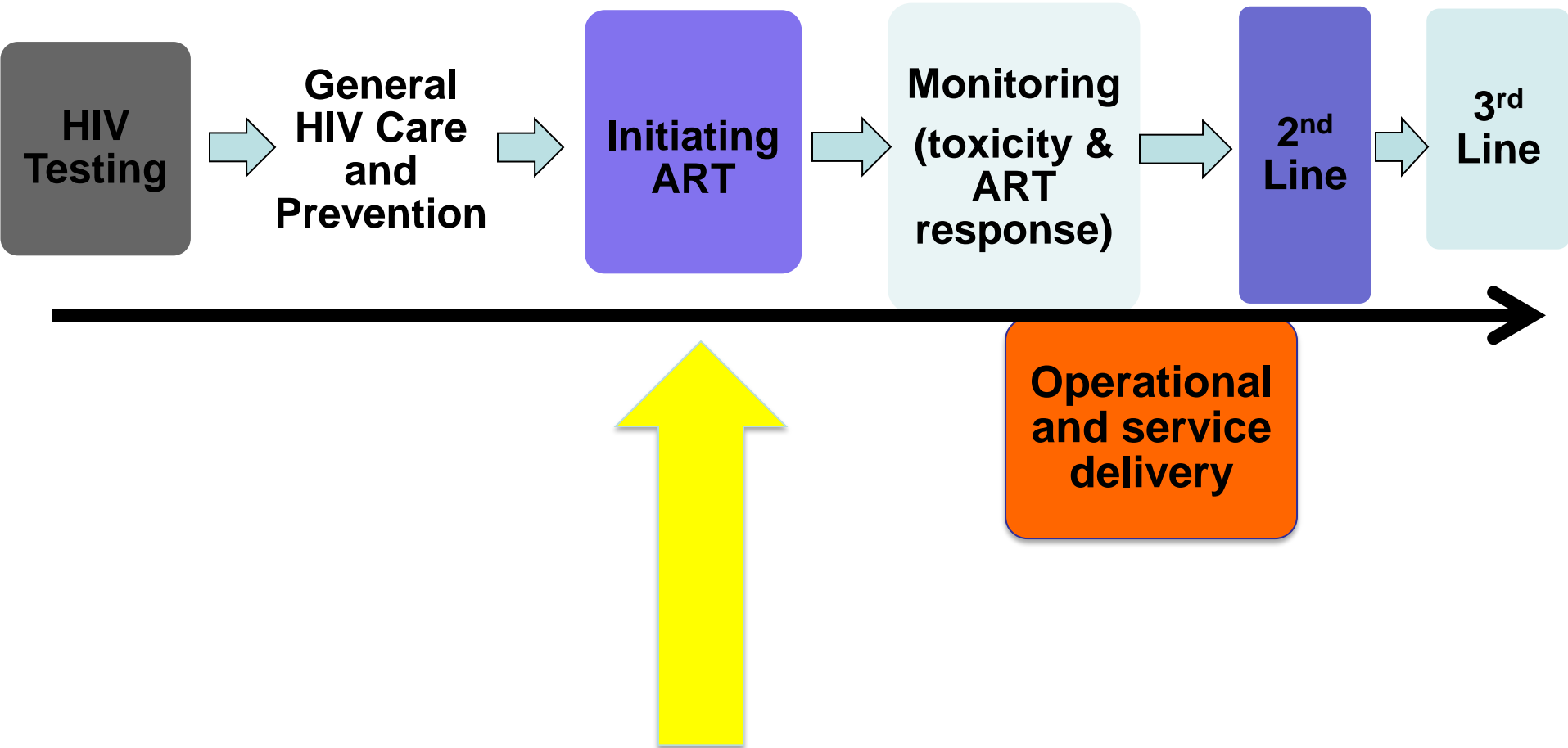
- Provider-initiated C&T systematic review: wide variation and mixed results in identifying previously undiagnosed individuals (Roura M. AIDS, 2013)
- Home-based C&T systematic review: High uptake of testing (88%) and of delivery of test result (77%) (Sabapathy K. PLoS Med, 2012)
- **Community-based C&T (outside health facilities) works in all sorts of settings, with various approaches and for different target groups including those with high CD4 counts (Suthar AB. PLoS Med, 2013)**

C&T effects

- **C&T improves HIV-related risk behavior (Fonner VA. Cochrane Database Syst Rev, 2012)**
- **C&T « modestly » reduces acquisition of HIV (ACCEPT HPTN 043. CROI, 2013)**

2013 WHO guidelines

Consolidation along the continuum of care



Number of 1st-line ARV regimens used to treat 90% of patients in care by region of the world - 2003-2005 (Egger M, CROI, 2007)

North America

59

South America

11

West, Central
& East Africa

3

Western Europe

47

Asia

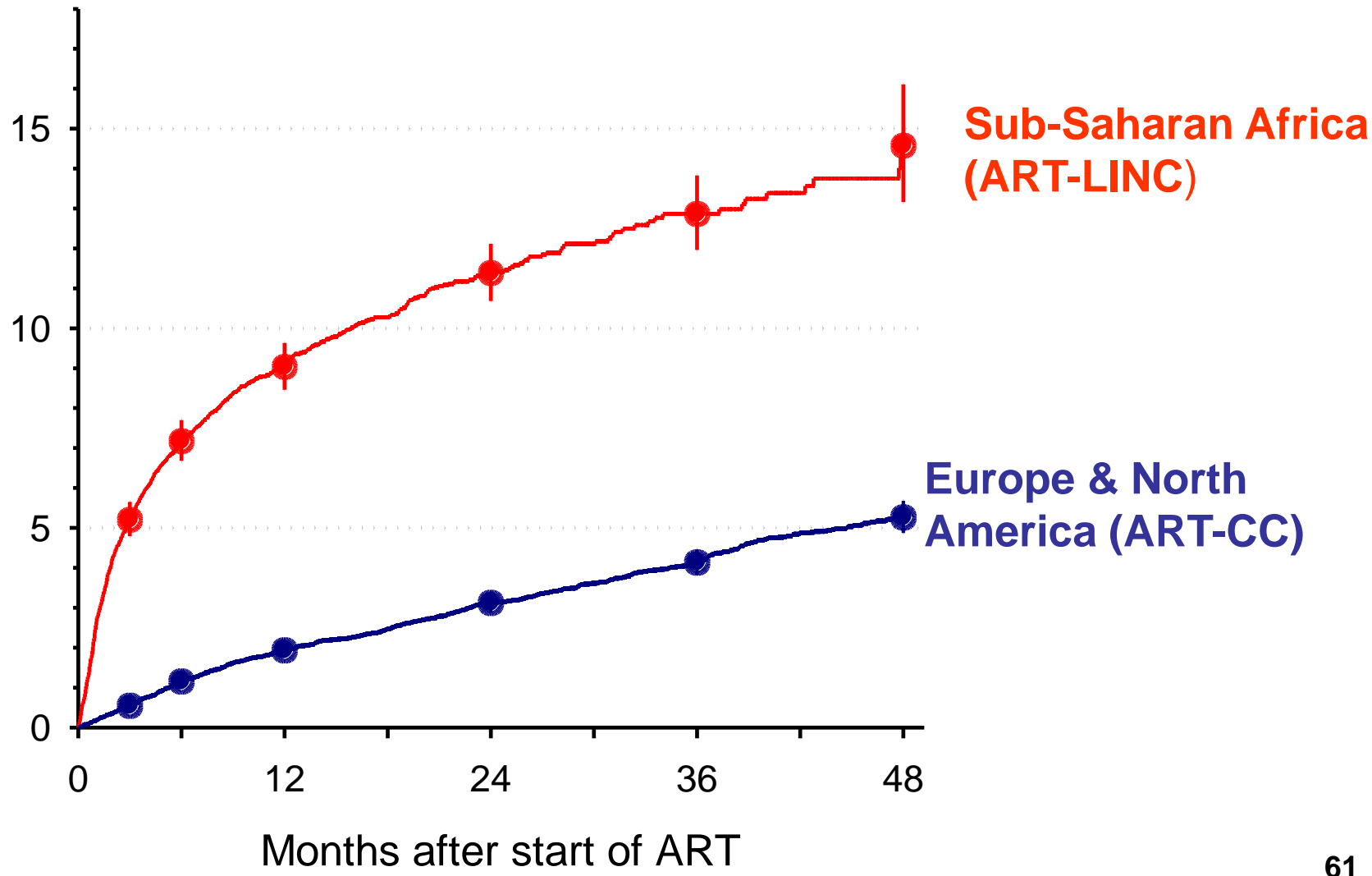
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Southern Africa

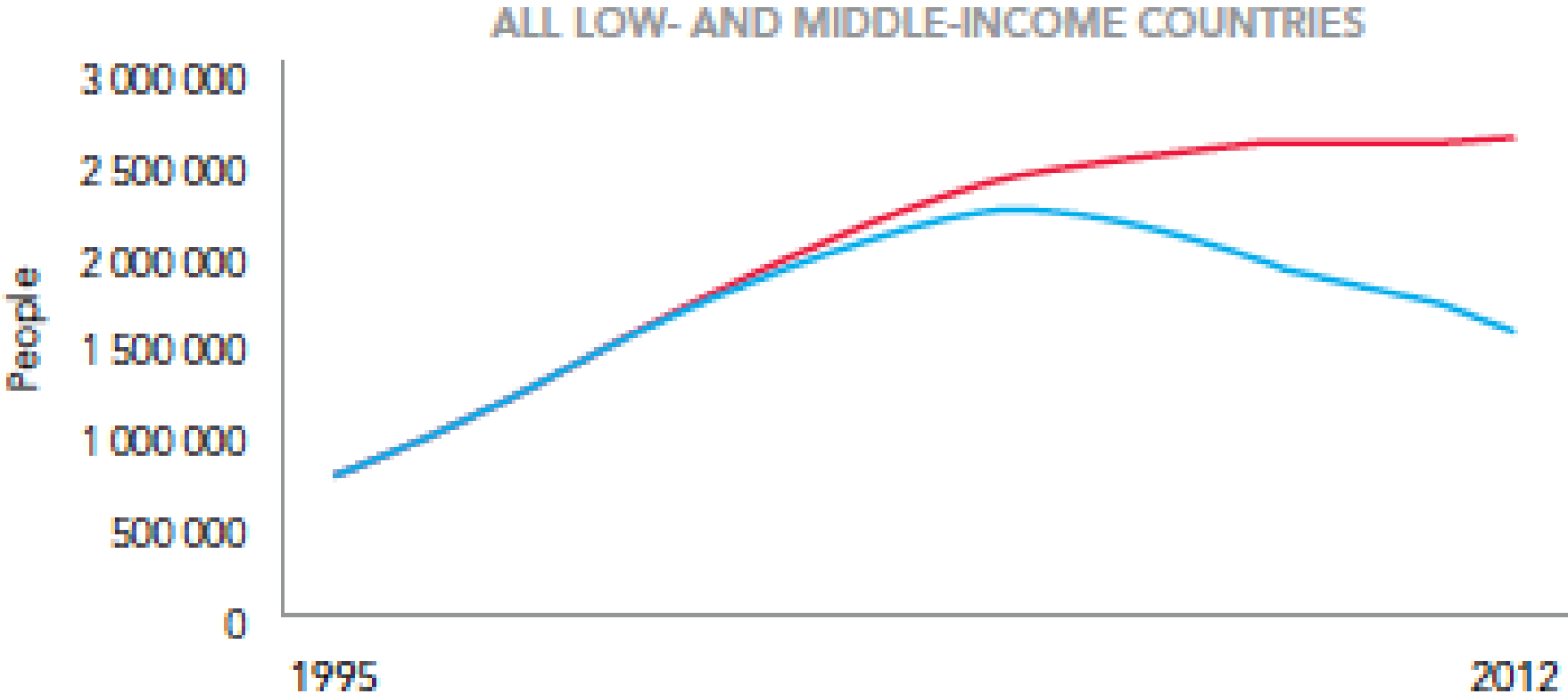
3

Comparison Switzerland - South Africa: Keiser O, PLOS Med, 2008

Mortality over four years (Lancet 2006 & CROI, 2007)



Estimated number of AIDS-related deaths, with and without antiretroviral therapy, in low- and middle-income countries, and by region, 1995–2012



HIV in 2011 - Overview

Where are we now?

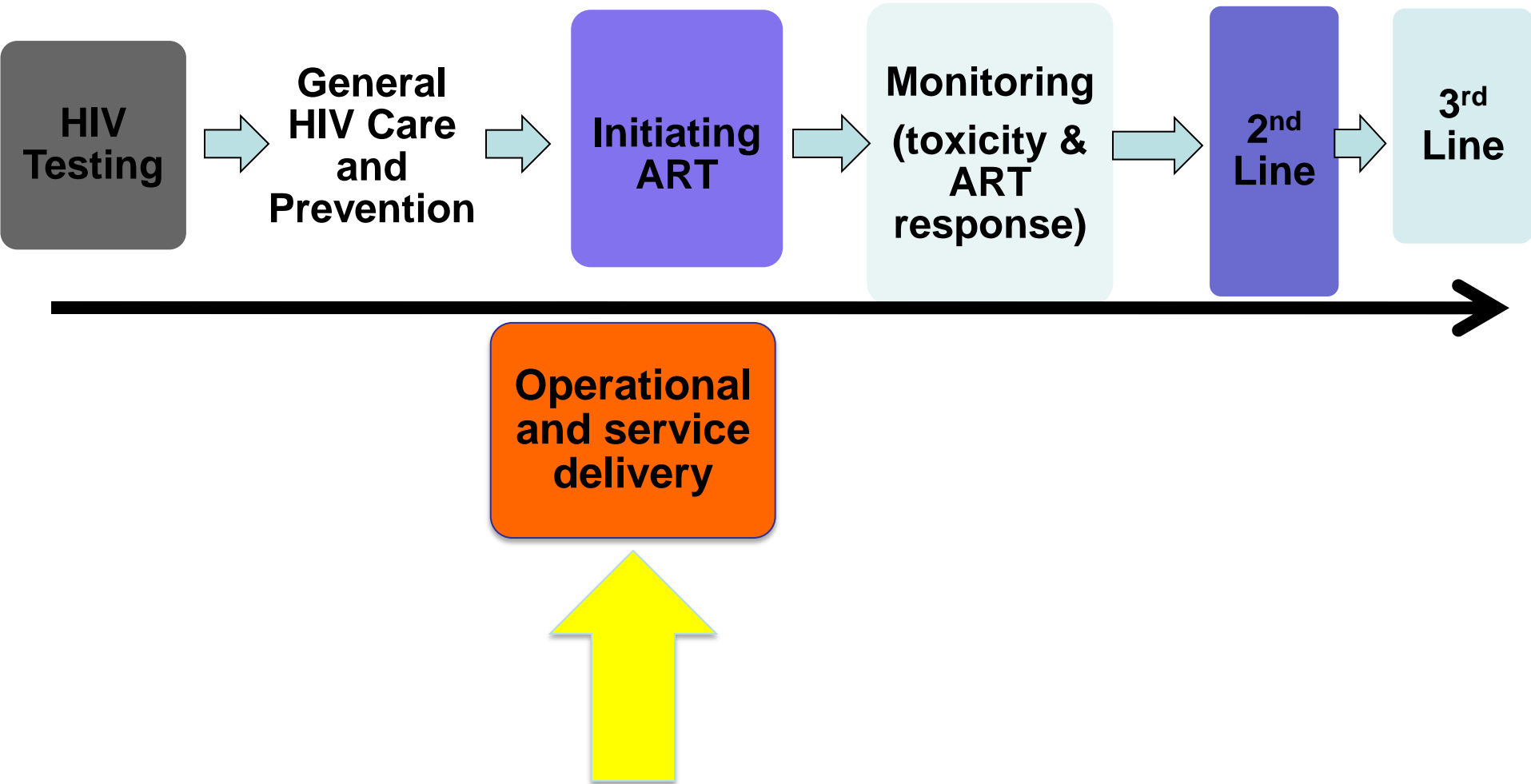
How did we get here?

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Biomedical prevention: the key to the future?

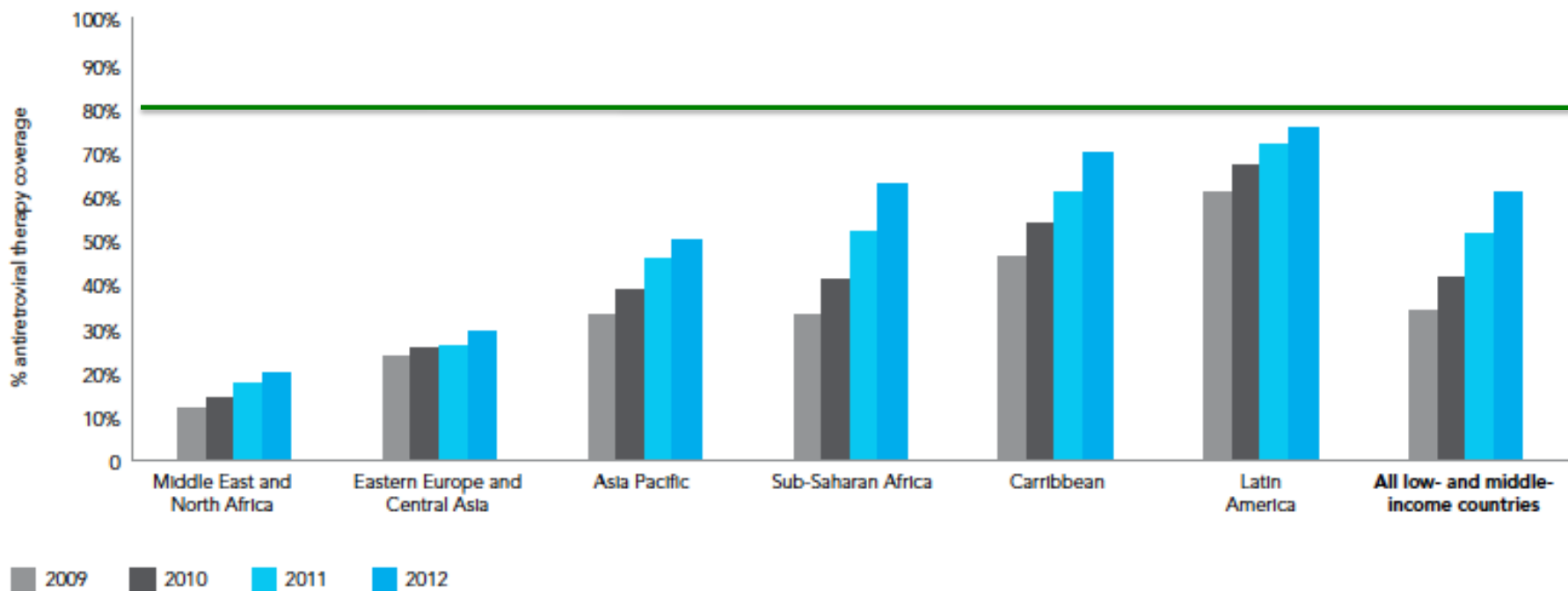
2013 WHO guidelines

Consolidation along the continuum of care



Although the number of people receiving ART has tripled in five years, the deficits in coverage persist

Percentage of people eligible who are receiving antiretroviral therapy (based on 2010 WHO guidelines) in low- and middle-income countries, by region, 2009–2012



Source: UNAIDS 2012 estimates.

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“Test and treat”

All HIV+

When?
How?

CD4 cell count at ART initiation is improving everywhere... but slowly (leDEA & ART-CC, JAIDS, 2013)

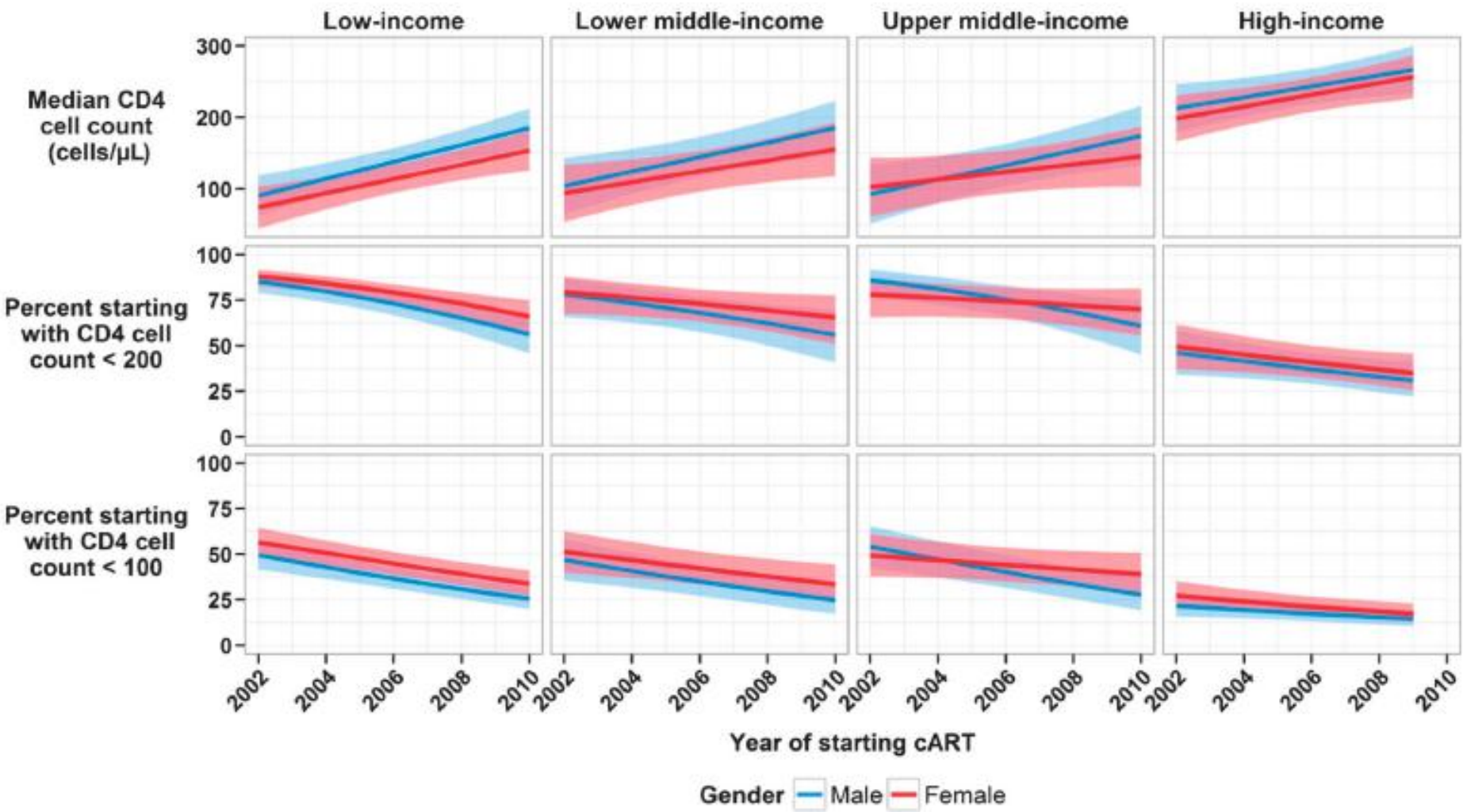
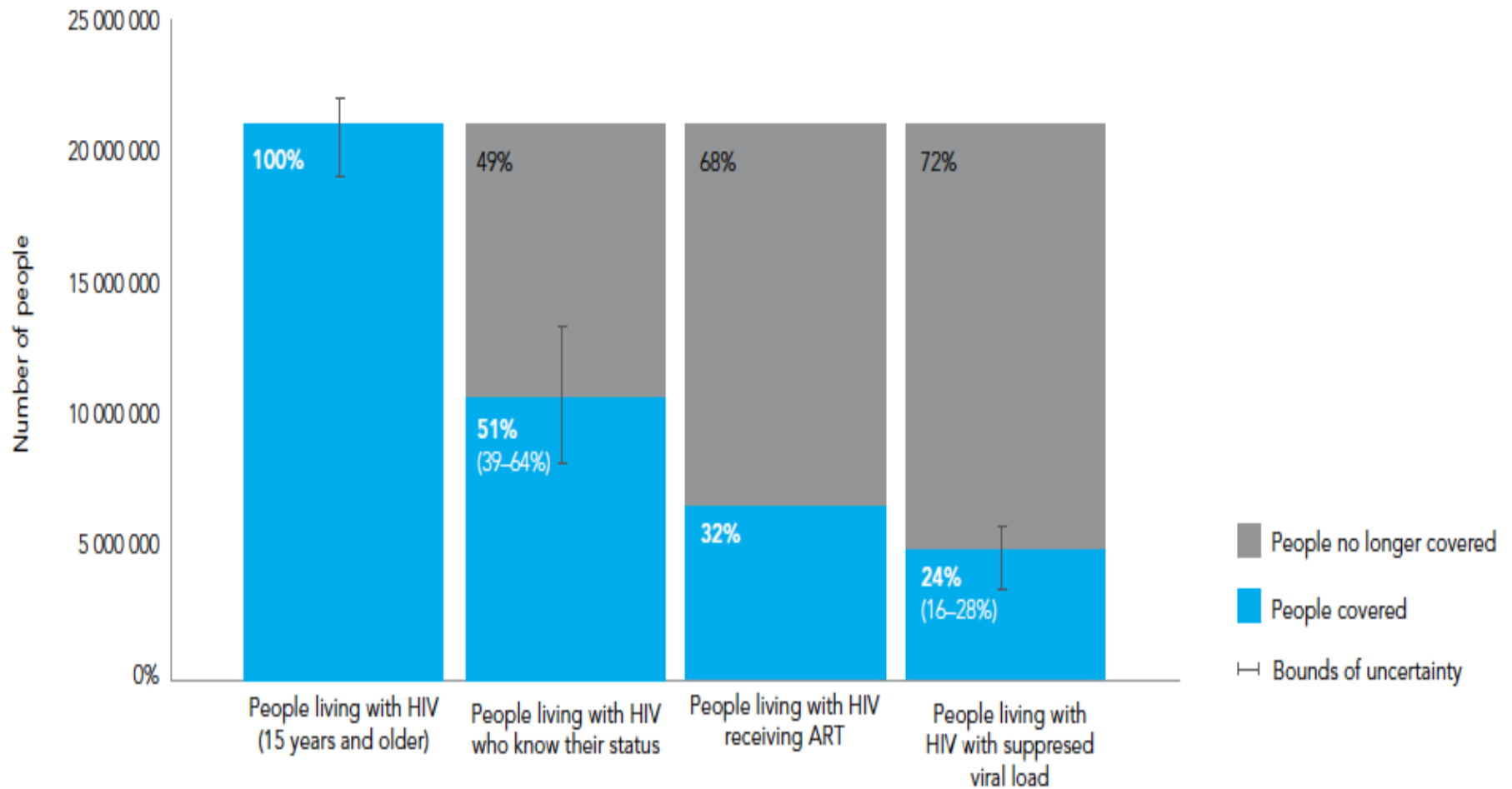
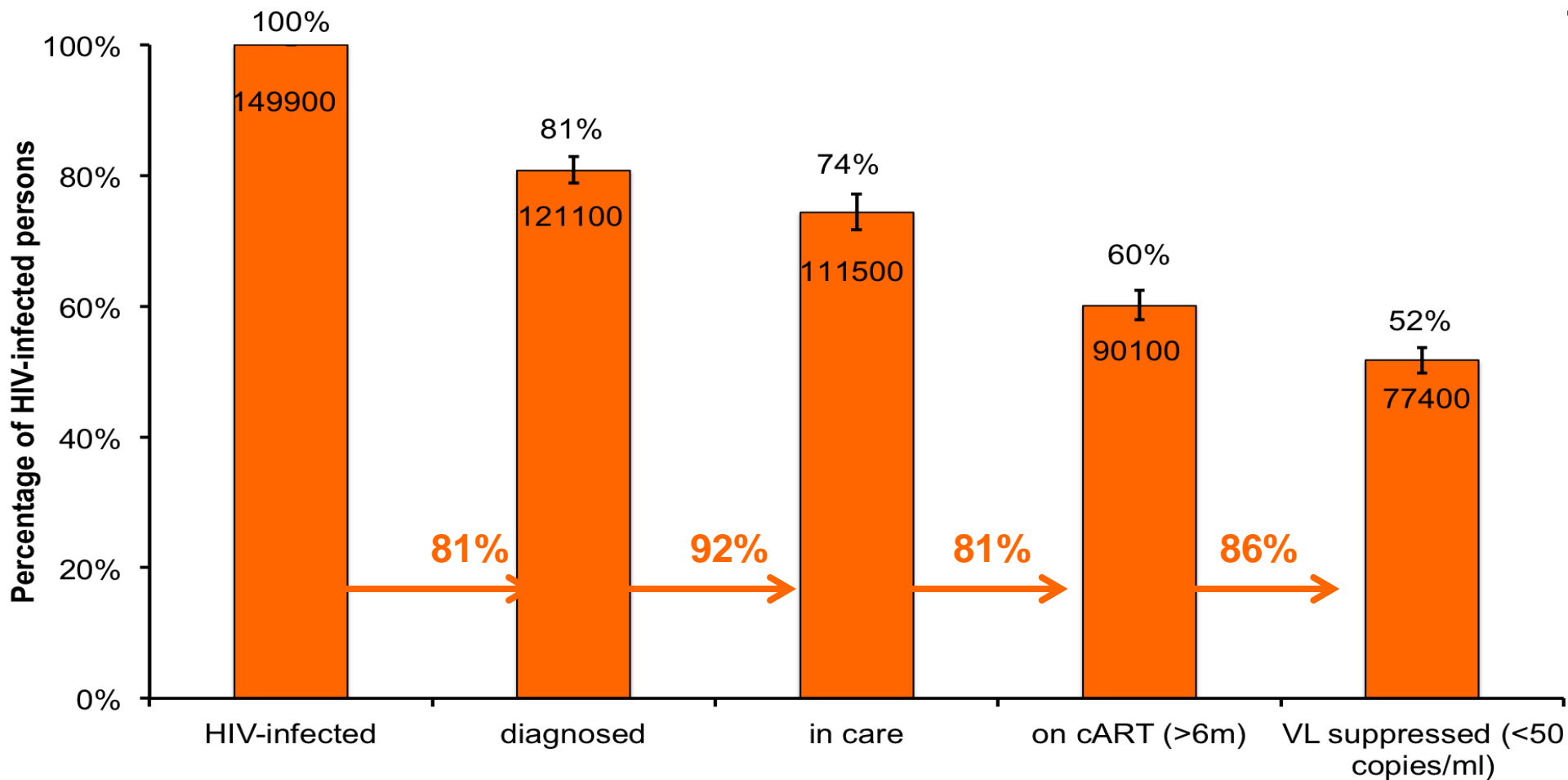


FIGURE 2. Trends of median CD4 cell counts at the start of cART (upper panel) and in proportions of men and women starting cART below 200 cells/μL (middle panel) or below 100 cells/μL (lower panel) in low-, middle-, and high-income countries, 2002–2010. The shaded areas represent the 95% CI for each year. Results from mixed effects linear regression (model 3) are based on 379,865 patients; missing values imputed using multiple imputation.

Abbreviated HIV treatment cascade for sub-Saharan Africa, 2012



Engagement in HIV care & treatment France, 2010



**1.6 million of patients started ART in 2012 ...
while 2.3 million of new infections occurred**



4 SCIENTIFIC PRIORITIES FOR THE COMING YEARS

- To study reservoirs with the aim to obtain CURE
- Test (screening) and Treat as early as Possible (TasP): document efficiency (field efficacy)
- To prevent new infections through biomedical interventions of proven efficacy: PMTCT (done), medical male circumcision (done), microbicides (?), PrEP (?), ...
- To develop new vaccine tools

In the 4 instances
A true North $\leftarrow \rightarrow$ South complementarity
Including economic research approaches

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**AND THINK
NOW ABOUT
VIRAL
HEPATITIS**

In
A true North ← Complementarity
Including eco approaches

HIV in 2013 - Overview

Where are we now?

How did we get here?

Challenges

Biomedical prevention: the key to the future?

Abstinence

Be faithful

Condom

(male) Circumcision

Counselling & Testing

Microbicides

Post-exposure prophylaxis

Pre-exposure prophylaxis

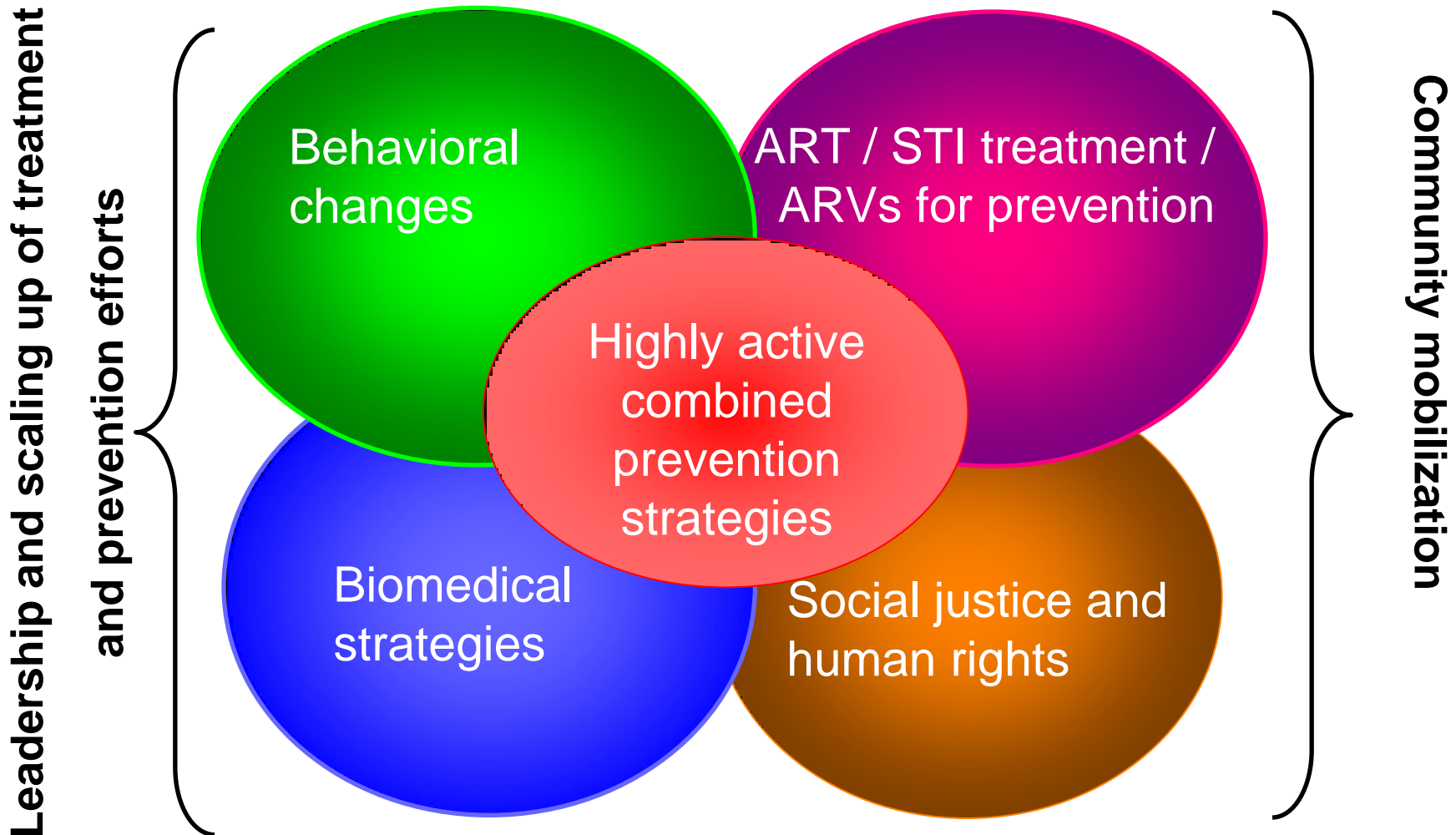
Sexually transmitted infections control

(antiretroviral) Treatment (TasP)

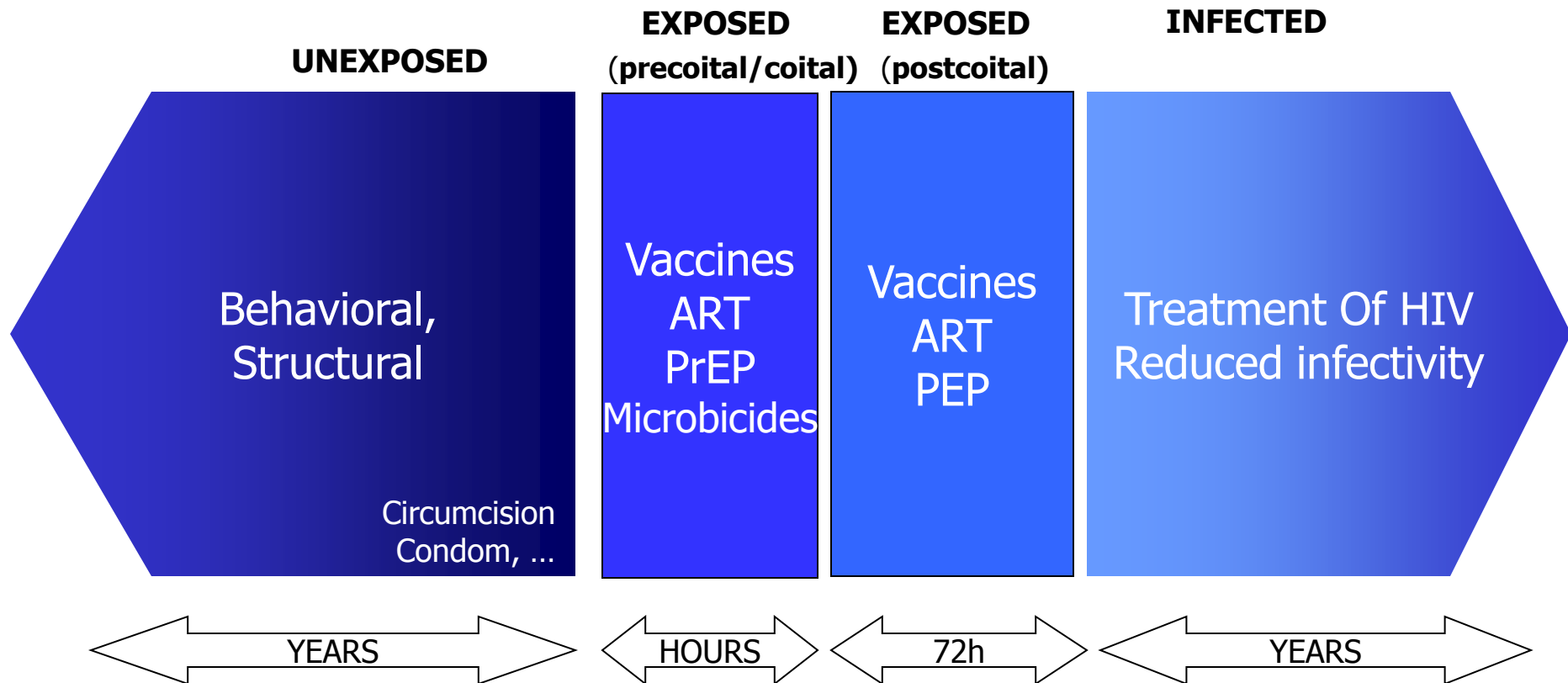
Vaccine



Combined prevention: a necessity to reduce the incidence of HIV markedly and durably



Four prevention opportunities



Adapted from Cohen, IAS 2008

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Agence nationale de recherches
sur le sida et les hépatites virales