The Global HIV/AIDS Epidemic, risk factors for transmission and Global response

Txema Calleja
HIV Dept. July 2013

Data based in UNAIDS and WHO Global reports
Outline

❖ Basic concepts

❖ HIV transmission factors

❖ HIV surveillance and estimates

❖ HIV Prevention:
  – Male circumcision
  – Treatment as Prevention

❖ HIV treatment

❖ Conclusions
Basic concepts
HIV epidemiology

1. Incidence of HIV Infection

2. Prevalence of HIV Infection

3. Mortality from AIDS
**HIV incidence**

- Incidence: Number of new HIV infections (number of people newly infected with HIV) usually per year
- Incidence rate: Rate of new HIV infections usually per 100 person-years usually per 100 susceptible persons [leaving out those already infected]
HIV epidemiology

1. Incidence of HIV Infection

2. Prevalence of HIV Infection

3. Mortality from AIDS
HIV prevalence

• Prevalence: Number of people with HIV infection
  or “Number of people living with HIV - PLHIV”
  usually per year
• Prevalence rate or Prevalence (%): Percentage of PLHIV per population
  usually per 100 population
HIV epidemiology

1. Incidence of HIV Infection

2. Prevalence of HIV Infection

3. Mortality from AIDS
Effect of Prevention Only

If Incident cases are prevented, Prevalence will decline – at a rate equal to the death rate of infected people.
AIDS-related mortality

- Number of AIDS-related deaths usually per year
- AIDS-specific mortality rate: usually per year per 100,000 or 100,000 population
- Proportion of AIDS deaths: of all deaths, the percentage that are due to AIDS
The natural course of incidence and prevalence of a local HIV epidemic over time

\[ R_t = R_0 > 1 \quad R_t < 1 \quad R_t = 1 \]

- Prevalence HIV
- Incidence HIV infection
- Incidence AIDS deaths
Dinamics of epidemic dissemination:
Basic rate of reproduction of and STI \( (R_o) \)

\[ R_o = \frac{B \times D \times C}{\text{Use of condom}} \]

- transmissibility (probability of infection)
- Duration of infectibility
- Rate of new couples
- Behaviour change
- Treatment of MST

Use of condom
What we know about HIV transmission and risk factors?
The Proximate-Determinants Framework

**Figure 1.** Proximate-determinants conceptual framework for factors affecting the risk of sexual transmission of HIV. ARVs, antiretrovirals; STI, sexually transmitted infection.
The new paradigm: HIV transmission does not occur at random, but is concentrated where risks come together.
Classification of epidemics - classic

Low level

• Principle: Although HIV infection may have existed for many years, it has never spread to significant levels in any sub-population.

• Infection is largely confined to individuals with higher risk behaviour: e.g. sex workers, drug injectors, MSM. This suggests that networks of risk are rather diffuse (low levels of partner exchange or sharing of drug injecting equipment), or a very recent introduction of the virus.

• Numerical proxy: HIV prevalence has not consistently exceeded five percent in any defined sub-population.
Classification of epidemics - classic

Concentrated

- Principle: HIV has spread rapidly in a defined sub-population, but is not well-established in the general population.
- This suggests active networks of risk within the sub-population. The future course of the epidemic is determined by the frequency and nature of links between highly infected sub-populations and the general population.
- Numerical proxy: HIV prevalence consistently over five percent in at least one defined sub-population. HIV prevalence below one percent in pregnant women in urban areas.
Classification of epidemics - classic

Generalised

• Principle: In generalised epidemics, HIV is firmly established in the general population.
• Although sub-populations at high risk may continue to contribute disproportionately to the spread of HIV, sexual networking in the general population is sufficient to sustain an epidemic independent of sub-populations at higher risk of infection.
• Numerical proxy: HIV prevalence consistently over one percent in pregnant women nation-wide.
Other classifications

- UNAIDS: Low-level, Concentrated, Generalized, Hyperendemic
- .... and several others
Epidemiology definitions: other considerations

- Statistics often presented separately for adults and children (also because major modes of transmission are different)

- Mortality among PLHIV can be due to AIDS or to other causes (accident, flu, etc.)
Incidence is not constant
New infections by type of exposure

Fig 1 Distribution of new HIV infections by type of exposure in selected countries, 1998-2002. Data on behaviour and HIV prevalence drawn from references 7-17

Source: Pisani et al. BMJ 2003; 326: 1384-7
Concentrated epidemics all follow similar patterns...

New infections strongly focused in a few behaviorally linked at-risk groups - IDUs, FSW and clients, MSM

And then spread to their lower-risk partners • Little generalized spread •
Thailand: changes of modes of transmission

Year:
- 1988
- 1990
- 1995
- 2000
- 2005

Transmission Modes:
- Extramarital
- Mother to Child
- Male from wife
- Female from husband
- Sex worker
- Male from sex worker
- Injection Drug User

Graph showing the percentage distribution of transmission modes from 1988 to 2005.
Number of infections per year and mode of transmission, Cambodia, 1988-2004

Source: Peerapatanapokin and Brown, using Asia Epidemic Model
Sexual and drug taking networks are frequently complex and intertwined. A “one size fits all” approach to addressing behavioral risk rarely addresses local realities.

Female partners (non FSW)

Male clients (non IDU or MSM)

MSM (non MSW)

Female sex workers (non MSW)

Male sex workers

Transgender

IDU

More common behaviors

Less common behaviors
Where we are with the HIV epidemic: HIV surveillance and estimates
Overview for HIV Estimates

Surveillance data from pregnant women at ANC and surveys and HIV prevalence from population based surveys

Surveillance data and size estimates for high risk groups and low risk populations

Estimation and Projection Package (EPP)

Adult HIV prevalence

UN Population Division’s population estimates

Epidemiology assumptions

Spectrum

PLWHA • New infections • AIDS deaths • Orphans • Treatment needs •
Dissemination of Documentation: tools and methods
Figure 2.4

Global prevalence of HIV, 2010

Source: UNAIDS.
New HIV infections and AIDS-related deaths

Globally new HIV infections peaked in 1997.
Global HIV trends, 1990 to 2009

- Number of people living with HIV
- Number of children living with HIV
- Adult and child deaths due to AIDS
- Number of orphans due to AIDS

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

Source: UNAIDS
# Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th></th>
<th>Adults and children living with HIV</th>
<th>Adults and children newly infected with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td><strong>SUB-SAHARAN AFRICA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>22.9 million [21.6–24.1 million]</td>
<td>1.9 million [1.7–2.1 million]</td>
<td>5.0 [4.7–5.2]</td>
<td>1.2 million [1.1–1.4 million]</td>
<td>1.4 [1.1–1.8]</td>
</tr>
<tr>
<td>2001</td>
<td>20.5 million [19.1–22.2 million]</td>
<td>2.2 million [2.1–2.4 million]</td>
<td>5.9 [5.6–6.4]</td>
<td>1.4 million [1.3–1.6 million]</td>
<td>2.0 [1.6–2.7]</td>
</tr>
<tr>
<td><strong>MIDDLE EAST AND NORTH AFRICA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>470 000 [350 000–570 000]</td>
<td>59 000 [40 000–73 000]</td>
<td>0.2 [0.2–0.3]</td>
<td>35 000 [25 000–42 000]</td>
<td>0.1 [0.1–0.2]</td>
</tr>
<tr>
<td>2001</td>
<td>320 000 [190 000–450 000]</td>
<td>43 000 [31 000–57 000]</td>
<td>0.2 [0.1–0.3]</td>
<td>22 000 [9700–38 000]</td>
<td>0.1 [0.1–0.2]</td>
</tr>
</tbody>
</table>
## Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th></th>
<th>Adults and children living with HIV</th>
<th>Adults and children newly infected with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Female</td>
</tr>
<tr>
<td><strong>SOUTH AND SOUTH-EAST ASIA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>4.0 million [3.6–4.5 million]</td>
<td>270 000 [230 000–340 000]</td>
<td>0.3 [0.3–0.3]</td>
<td>250 000 [210 000–280 000]</td>
<td>0.1 [0.1–0.2]</td>
</tr>
<tr>
<td>2001</td>
<td>3.8 million [3.4–4.2 million]</td>
<td>380 000 [340 000–420 000]</td>
<td>0.3 [0.3–0.4]</td>
<td>230 000 [200 000–280 000]</td>
<td>0.2 [0.2–0.2]</td>
</tr>
<tr>
<td><strong>EAST ASIA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>790 000 [580 000–1.1 million]</td>
<td>88 000 [48 000–160 000]</td>
<td>0.1 [0.1–0.1]</td>
<td>56 000 [40 000–76 000]</td>
<td>&lt;0.1 [&lt;0.1–&lt;0.1]</td>
</tr>
<tr>
<td>2001</td>
<td>380 000 [280 000–530 000]</td>
<td>74 000 [54 000–100 000]</td>
<td>&lt;0.1 [&lt;0.1–0.1]</td>
<td>24 000 [16 000–45 000]</td>
<td>&lt;0.1 [&lt;0.1–&lt;0.1]</td>
</tr>
</tbody>
</table>
### Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th>Region</th>
<th>Year</th>
<th>Adults and children newly infected with HIV</th>
<th>Adults and children living with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OCEANIA</td>
<td>2010</td>
<td>54 000 [48 000–62 000]</td>
<td>3300 [2400–4200]</td>
<td>0.3 [0.2–0.3]</td>
<td>1600 [1200–2000]</td>
<td>0.1 [0.1–0.1] [0.1–0.2]</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>41 000 [34 000–50 000]</td>
<td>4000 [3300–4600]</td>
<td>0.2 [0.2–0.3]</td>
<td>1800 [1300–2900]</td>
<td>0.1 [0.1–0.2] [0.2–0.3]</td>
</tr>
<tr>
<td>LATIN AMERICA</td>
<td>2010</td>
<td>1.5 million [1.2–1.7 million]</td>
<td>100 000 [73 000–140 000]</td>
<td>0.4 [0.3–0.5]</td>
<td>67 000 [45 000–92 000]</td>
<td>0.2 [0.1–0.4] [0.1–0.2]</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>1.3 million [1.0–1.7 million]</td>
<td>99 000 [75 000–130 000]</td>
<td>0.4 [0.3–0.5]</td>
<td>83 000 [50 000–130 000]</td>
<td>0.2 [0.1–0.6] [0.1–0.2]</td>
</tr>
</tbody>
</table>
Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th></th>
<th>Adults and children living with HIV</th>
<th>Adults and children newly infected with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>CARIBBEAN</strong></td>
<td>2010</td>
<td>200 000</td>
<td>12 000</td>
<td>0.9</td>
<td>9000</td>
</tr>
<tr>
<td></td>
<td>2000–22 000</td>
<td>9400–17 000</td>
<td>0.8–1.0</td>
<td>6900–12 000</td>
<td>0.3 [0.3–0.7]</td>
</tr>
<tr>
<td></td>
<td>2010</td>
<td>210 000</td>
<td>19 000</td>
<td>1.0</td>
<td>18 000</td>
</tr>
<tr>
<td></td>
<td>[170 000–240 000]</td>
<td>[16 000–22 000]</td>
<td>[0.9–1.2]</td>
<td>[14 000–22 000]</td>
<td>[0.6–1.1]</td>
</tr>
<tr>
<td><strong>EASTERN EUROPE</strong></td>
<td>2010</td>
<td>1.5 million</td>
<td>160 000</td>
<td>0.9</td>
<td>90 000</td>
</tr>
<tr>
<td></td>
<td>[1.3–1.7 million]</td>
<td>[110 000–200 000]</td>
<td>[0.8–1.1]</td>
<td>[74 000–110 000]</td>
<td>[0.4–0.7]</td>
</tr>
<tr>
<td></td>
<td>2001</td>
<td>410 000</td>
<td>210 000</td>
<td>0.3</td>
<td>7800</td>
</tr>
<tr>
<td></td>
<td>[340 000–490 000]</td>
<td>[170 000–240 000]</td>
<td>[0.2–0.3]</td>
<td>[6000–11 000]</td>
<td>[0.1–0.2]</td>
</tr>
</tbody>
</table>
### Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th>Region</th>
<th>Adults and children living with HIV</th>
<th>Adults and children newly infected with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>WESTERN AND CENTRAL EUROPE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>840 000 [770 000–930 000]</td>
<td>30 000 [22 000–39 000]</td>
<td>0.2 [0.2–0.2]</td>
<td>9900 [8900–11 000]</td>
<td>0.1 [0.1–0.1] [&lt;0.1–0.1]</td>
</tr>
<tr>
<td>2001</td>
<td>630 000 [580 000–690 000]</td>
<td>30 000 [26 000–34 000]</td>
<td>0.2 [0.2–0.2]</td>
<td>10 000 [9500–11 000]</td>
<td>0.1 [0.1–0.1] [0.1–0.1]</td>
</tr>
</tbody>
</table>

| **NORTH AMERICA**     |                                    |                                            |                      |                                  |                                     |
| 2010                  | 1.3 million [1.0–1.9 million]      | 58 000 [24 000–130 000]                   | 0.6 [0.5–0.9]        | 20 000 [16 000–27 000]           | 0.3 [0.2–0.6] [0.1–0.4]            |
| 2001                  | 980 000 [780 000–1.2 million]      | 49 000 [34 000–70 000]                    | 0.5 [0.4–0.7]        | 19 000 [15 000–24 000]           | 0.3 [0.2–0.4] [0.1–0.3]            |
### Regional HIV and AIDS statistics, 2010 and 2001

Regional estimates of adults and children newly infected with HIV, people living with HIV, and AIDS-related deaths

<table>
<thead>
<tr>
<th></th>
<th>Adults and children living with HIV</th>
<th>Adults and children newly infected with HIV</th>
<th>Adult prevalence (%)</th>
<th>Adult and child deaths due to AIDS</th>
<th>Young people (15–24) prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>2010</strong></td>
<td><strong>2001</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>34.0 million</td>
<td>2.7 million</td>
<td>0.8</td>
<td>1.8 million</td>
<td>0.3</td>
</tr>
<tr>
<td></td>
<td>[31.6–35.2 million]</td>
<td>[2.4–2.9 million]</td>
<td>[0.8–0.8]</td>
<td>[1.6–1.9 million]</td>
<td>[0.3–0.3]</td>
</tr>
<tr>
<td></td>
<td>28.6 million</td>
<td>3.1 million</td>
<td>0.8</td>
<td>1.9 million</td>
<td>0.4</td>
</tr>
<tr>
<td></td>
<td>[26.7–30.9 million]</td>
<td>[3.0–3.3 million]</td>
<td>[0.7–0.8]</td>
<td>[1.7–2.2 million]</td>
<td>[0.4–0.4]</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[0.7–0.8]</td>
</tr>
</tbody>
</table>
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.
New HIV infection trends

The course of new HIV infections, compared to estimates if key changes had not happened
GLOBAL HIV/AIDS RESPONSE

Epidemic update and health sector progress towards Universal Access

Progress Report 2011
Number of people receiving antiretroviral therapy in low- and middle-income countries, by region, 2002–2010
Scale-up of ART, number of AIDS deaths and new HIV infections in LMIC*, 2001–2011

*LMIC = Low- and middle-income countries
8 million on ART by end 2011
...15 million is achievable!
ART scale-up: three success stories

- High-level commitment and resources
- Proactive approaches to HIV testing
- Innovation in service delivery

Integration
Task-shifting
Community-based services

World Health Organization

Principles and Practice of Sexually Transmitted Diseases Prevention and Care
Disparities in ART coverage between regions and populations

- **Sub-Saharan Africa**: 62%
- **Latin America & Caribbean**: 70%
- **Asia**: 46%
- **Eastern Europe & Central Asia**: 23%
- **Middle East & North Africa**: 14%
- **All**: 57%
- **Children**: 28%
- **IDUs**: <10%

* 2010 HIV case reporting (18 countries)
Proportion of eligible population receiving antiretroviral therapy in low- and middle-income countries at the end of 2010

Rapid increases in ART coverage are helping more countries achieve universal access to treatment, care and support.

<table>
<thead>
<tr>
<th>Proportion</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>20%–39%</td>
<td>Algeria, Indonesia, Angola, Kazakhstan, Armenia, Lebanon, Azerbaijan, Liberia, Bangladesh, Lithuania, Bhutan, Malaysia, Bolivia, Mauritania, Bulgaria, Mongolia, Burundi, Morocco, Cameroon, Myanmar, CAR, Niger, Chad, Nigeria</td>
</tr>
<tr>
<td>40%–59%</td>
<td>Belarus, Malawi, Belize, Mali, Benin, Mozambique, Burkina Faso, Oman, Cape Verde, Papua New Guinea, Congo, Peru, El Salvador, Philippines, Eritrea, Senegal, Gabon, South Africa, Guatemala, Suriname</td>
</tr>
<tr>
<td>60%–79%</td>
<td>Argentina, Mexico, Brazil, Paraguay, Guatemala, El Salvador, Hungária, Costa Rica, Romania, Botswana, Guyana, Dominican Republic, Swaziland, Cambodia, Namibia, Ecuador, Thailand, Chile, Nicaragua, Ethiopia, Uruguay, Comoros, Rwanda, Georgia, Zambia, Croatia, Slovakia, Latvia, Hungary, Sri Lanka, India, Uzbekistan, Lao PDR, Viet Nam, Lesotho, Zimbabwe, Kenya</td>
</tr>
<tr>
<td>&gt;80%</td>
<td>Maldives, Ukraine, Tanzania, Senegal, South Africa, Uganda, Tanzania, Brazil, Paraguay, Argentina, Mexico, Brazil, Paraguay, Guatemala, El Salvador, Hungária, Costa Rica, Romania, Botswana, Guyana, Dominican Republic, Swaziland, Cambodia, Namibia, Ecuador, Thailand, Chile, Nicaragua, Ethiopia, Uruguay, Comoros, Rwanda, Georgia, Zambia, Croatia, Slovakia, Latvia, Hungary, Sri Lanka, India, Uzbekistan, Lao PDR, Viet Nam, Lesotho, Zimbabwe, Kenya</td>
</tr>
</tbody>
</table>

New infections, behaviour change and treatment coverage in Botswana

Source: Botswana AIDS indicator surveys; UNAIDS; WHO.
Condom use and HIV prevalence among sex workers in Cambodia


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

- Sub-Saharan Africa
  - 2005: 9%
  - 2008: 35%
  - 2009: 42%
  - 2010: 45%

- Eastern and Southern Africa
  - 2005: 16%
  - 2008: 43%
  - 2009: 52%
  - 2010: 52%

- Western and Central Africa
  - 2005: 3%
  - 2008: 21%
  - 2009: 25%
  - 2010: 25%

- Latin America and the Caribbean
  - 2005: 29%
  - 2008: 53%
  - 2009: 56%
  - 2010: 61%

- Latin America
  - 2005: 29%
  - 2008: 53%
  - 2009: 56%
  - 2010: 61%

- Caribbean
  - 2005: 24%
  - 2008: 60%
  - 2009: 62%
  - 2010: 66%

- East, South and South-East Asia
  - 2005: 3%
  - 2008: 12%
  - 2009: 18%
  - 2010: 20%

- Eastern Europe and Central Asia
  - 2005: 35%
  - 2008: 59%
  - 2009: 57%
  - 2010: 59%

- North Africa and the Middle East
  - 2005: 0%
  - 2008: 0%
  - 2009: 1%
  - 2010: 1%

- Total low- and middle-income countries
  - 2005: 8%
  - 2008: 26%
  - 2009: 35%
  - 2010: 35%
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
Scale-up possible: Example of Elimination of new infections in children

More than half of pregnant women covered by ART in countries with a generalized epidemic, 2011

<table>
<thead>
<tr>
<th>Country</th>
<th>&lt;25%</th>
<th>25–49%</th>
<th>50–74%</th>
<th>75–100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chad</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Djibouti</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Eritrea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethiopia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Sudan</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benin</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burkina Faso</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAR</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gabon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guinea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Guinea-Bissau</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Burundi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cameroon</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Côte d’Ivoire</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenya</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesotho</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liberia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malawi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mozambique</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rwanda</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sierra Leone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Togo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UR Tanzania</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zimbabwe</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Botswana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ghana</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haiti</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Namibia</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swaziland</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: 2012 country progress reports (www.unaids.org/cpr) and UNAIDS estimates.
Estimated percent of pregnant women living with HIV who receive effective antiretroviral regimens, in 22 priority countries

<table>
<thead>
<tr>
<th>0%–39%</th>
<th>40%–79%</th>
<th>&gt;80%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angola</td>
<td>Cameroon</td>
<td>Botswana</td>
</tr>
<tr>
<td>Burundi</td>
<td>Côte d'Ivoire</td>
<td>Mozambique</td>
</tr>
<tr>
<td>Chad</td>
<td>Ghana</td>
<td>Uganda</td>
</tr>
<tr>
<td>DR Congo</td>
<td>Kenya</td>
<td>UR Tanzania</td>
</tr>
<tr>
<td>India</td>
<td>Mozambique</td>
<td>Namibia</td>
</tr>
<tr>
<td>Malawi</td>
<td>Zambia</td>
<td>South Africa</td>
</tr>
<tr>
<td>Nigeria</td>
<td>Zimbabwe</td>
<td>Swaziland</td>
</tr>
</tbody>
</table>

*Note: no estimate is available for Ethiopia*

New HIV infections among children: Scenarios for 21 priority countries

Note: These 21 countries, plus India, comprise the 22 priority countries in the Global Plan Towards the Elimination of New HIV infections Among Children and Keeping Their Mothers Alive.
Outline

- HIV Prevention:
  - Male circumcision
  - Treatment as Prevention
HIV prevention through male circumcision
Research: ecological studies
HIV seroprevalence in 37 African cities and proportion of males circumcised

Source: Bongaarts, AIDS 1989
MC and HIV prevalence: geographic variation in Africa
Adapted from Halperin & Bailey, *Lancet* 1999; 354: 1813

![Graph showing MC and HIV prevalence in various African countries in 1999.](image)

**MC Prevalence < 20%**
- Zimbabwe: 25.8%
- Botswana: 25.1%
- Namibia: 19.9%
- Zambia: 19.1%
- Swaziland: 18.5%
- Malawi: 14.9%
- Mozambique: 14.2%
- Rwanda: 12.8%
- Kenya: 11.6%
- Congo: 7.6%
- Cameroon: 4.9%
- Nigeria: 4.1%
- Gabon: 4.3%
- Liberia: 3.7%
- Sierra Leone: 3.2%
- Ghana: 2.4%
- Benin: 2.1%
- Guinea: 2.1%

**MC Prevalence > 80%**
Randomised controlled trials of MC to reduce HIV infection completed

Rakai, Uganda
Gray et. al. (2007)
Lancet; 369: 657 – 66

Kisumu, Kenya
Bailey et. al. (2007)
Lancet; 369: 643 – 56

Orange Farm, South Africa
Auvert et. al. (2005)

### Completed Efficacy Trials of Interventions for Prevention of Sexual Transmission of HIV (by Oct 2011)

<table>
<thead>
<tr>
<th>Intervention</th>
<th>Completed</th>
<th>Efficacious</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioral, social</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>Cervical barriers</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Male circumcision (heterosexuals)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Orange Farm, Rakai, Kisumu – protective effect for males)</td>
</tr>
<tr>
<td>STI treatment</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Mwanza)</td>
</tr>
<tr>
<td>HSV-2 suppression</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>PrEP (oral)</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>TDF ± FTC - MSM, transgender, heterosexuals</td>
<td></td>
<td>(iPrEx, TDF-2, Partners PrEP)</td>
</tr>
<tr>
<td>ART for HIV+ partner (HIV)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>heterosexual serodiscordant couples</td>
<td></td>
<td>(HTPN052)</td>
</tr>
<tr>
<td>Microbicides (Nonoxynol 9, C31G, Cellulose sulphate, PC-515, Buffer Gel, PRO 2000, TDF vaginal gel)</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>HIV vaccines (rgp 120, M RK Ad5, RV 144)</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Thai RV 144)</td>
</tr>
<tr>
<td>TOTAL</td>
<td>43</td>
<td>10</td>
</tr>
</tbody>
</table>
Evidence summary

Overall 60% reduction in risk

Weiss et al, AIDS. 2008;22(5):567-74
Current Issues

Strategic use of antiretrovirals

Antiretroviral Treatment as HIV Prevention:
Geographical distribution of ART for prevention studies

Dark blue represents countries conducting ART in prevention research, light blue represents country-wide efforts (United States, Swaziland), red dots represent selected study sites within countries (some countries had too many sites to represent on this graphic)

Source: Granich et al 2011
Rakai Study of viral load and HIV transmission

Quinn et al, NEJM 2000
Evidence from HPTN 052

1763 HIV-discordant couples in 9 countries, CD4=250-550
Randomized to immediate or deferred treatment
Stopped for efficacy
39 HIV-ve partners were infected of which 29 were linked virologically to the infected partner
Of these 29 only 1 was in the immediate treatment group HR = 0.04 (95% CI: 0.01–0.27)
Also significant reduction in morbidity endpoints in treated individuals – HR for serious clinical endpoints = 0.59 (95% CI: 0.40-0.88)
Balance of evidence favours earlier initiation of ART

Delayed ART
- Drug toxicity
- Resistance
- Upfront costs
- Preservation of Tx options

Earlier ART
- Clinical benefits (AIDS- and non-AIDS related)
- HIV and TB transmission
- Potency, durability, tolerability
- Treatment sequencing options
- Medium/long-term cost savings
Relationship between transmitted resistance to NNRTI drugs and ART coverage in LMIC

Going to Zero? The 2011 Investment Framework
Combination prevention and treatment (new guidelines)

Number of new HIV infections

- Base
- IF
- IF Enhanced
- IFE + TasP (high)
- IFE + CTP + STI + TasP (high)

World Health Organization
Conclusions

- HIV epidemic stable and declining but with increasing in some geographical areas or populations
- Improved national response in LMIC
- MC as a tool in SSA for prevention
- Treatment as Prevention strategies
- New Comprehensive WHO guidelines in 2013 on the use of ARVs