CONTROLLING THE HIV EPIDEMIC WITH ANTIRETROVIRALS

Having the Courage of Our Convictions

1-2 October 2015 • Paris
Where is the Demand? – Clearing Bottlenecks to Attaining the 90-90-90 Targets

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Vice President and Chief Technical Advisor (IAPAC)
Ding dong the CD4 witch is dead!

Test and start guidelines will have a major impact on our HIV response
Outline

• Current situation
• Bottlenecks
  – Accountability and open data
  – M and E and cascade
  – Policy
  – Global financial situation
  – Leadership
Are we on track to end epidemic?

By end of 2014:

• ~50% of people living with HIV do not know their status
• ~22 million (59%) are not on treatment
• ~1.2 million deaths
• ~2 million new infections (5480 per day; 228 per hour)
Global access to HIV treatment, 2010-2014

People living with HIV and people on ART

- 2010: 7.5 mn
- 2011: 9.4 mn
- 2012: 11.4 mn
- 2013: 13 mn
- 2014: 15 mn

81% on ART

 Millions

On ART

People living with HIV on ART

People living with HIV

2010 2011 2012 2013 2014
Eight countries account for 59% of Global AIDS Deaths, 2013
Trends in estimated death rate per 1000 PLHIV, 2011-2013

Outline

• Bottlenecks
  – Monitoring and evaluation
  – Policy
  – Cascade
  – Global finance
  – Research ethics
  – Leadership
  – Defining end game and metrics for success
  – PrEP vs Tx
  – Community engagement and activist voice
Information delay bottleneck

Shorten OODA loop
Data hoarding bottleneck

Open data principles (Sebastapol, California 2007)

1) Complete
2) Primary
3) Timely
4) Accessible
5) Machine processable (not image)
6) Non-discriminatory (anyone, anon)
7) Non-proprietary
8) License-free
Example of near real time open data

Bonus question beer or soft drink...
• Note counter—time and number on ART
• Google map based—drill down possible
• Slider allows for backward look at previous years
FAST-TRACK CITY DASH BOARD
UNAIDS targets: harnessing treatment as prevention

- Know status: 90%
- On treatment: 90%
- Virally suppressed: 90%

Cascade:
- 90%
- 81%
- 73%
Public Domain Cascade Search

Identification (83)
- 30 cascades identified through PubMed search
- 53 cascades identified through UNAIDS country progress reports, WHO/UNAIDS reports, national reports, and conference papers

Screening (57)
57 recent cascades selected (2011-2015)

Methods Review (43)
43 cascade reviewed for methodology and data collected on the 4 key indicators in the cascade

Data analysis (35)
35 graded cascades compared and analyzed for progress towards 90-90-90

26 old cascades excluded

14 cascades were excluded:
- 7 cascades reported preliminary/unconfirmed national figures
- 7 cascades were from second hand reports

8 cascades that did not have viral suppression estimates and/or had data discrepancies excluded
# Methods review:

high, medium, low quality methods

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Estimated PLHIV</th>
<th>Diagnosed</th>
<th>On ART</th>
<th>Viral suppression</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antigua and Barbuda</td>
<td>Newspaper article</td>
<td>Data not available</td>
<td>National programme data</td>
<td>National programme data</td>
<td>Data not available</td>
<td>Incomplete</td>
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<tr>
<td>Argentina</td>
<td>National programme report</td>
<td>UNAIDS estimate</td>
<td>Not available</td>
<td>Not available</td>
<td>VL &lt;50 copies/mL</td>
<td>Source?</td>
</tr>
<tr>
<td>Armenia</td>
<td>UNAIDS meeting report</td>
<td>UNAIDS estimate</td>
<td>Not available</td>
<td>Not available</td>
<td>VL &lt;50 copies/mL</td>
<td>Source?</td>
</tr>
<tr>
<td>Australia</td>
<td>National surveillance report</td>
<td>Diagnosed + Undiagnosed (based on cross-sectional prevalence surveys and on reported HIV and AIDS cases)</td>
<td>National HIV Registry and estimation of deaths</td>
<td>ART coverage is estimated as average of 4 approaches: ARV prescription count (Australian HIV Observational Database or AHOD), self-reported ART use in large national survey, pharmacy dispensing data from New South Wales study in Victoria analyzing data on ARVs and non-identified individuals receiving ART in Melbourne</td>
<td>VL &lt;400 copies/mL Calculated as proportion of people with viral suppression recorded in AHOD (cohort size of 2,072)</td>
<td>Medium</td>
</tr>
<tr>
<td>Belarus</td>
<td>National programme review by WHO</td>
<td>Numbers based on estimate 8 personal communications with the Infectious Disease Hospital in Minsk</td>
<td>Numbers based on estimate 8 personal communications with the Infectious Disease Hospital in Minsk</td>
<td>Numbers based on estimate and personal communications with the Infectious Disease Hospital in Minsk</td>
<td>Numbers based on estimate and personal communications with the Infectious Disease Hospital in Minsk</td>
<td>Medium</td>
</tr>
<tr>
<td>Belgium</td>
<td>National cohort data</td>
<td>UNAIDS estimate</td>
<td>National registration of new diagnosis</td>
<td>National cohort data</td>
<td>VL &lt;500 copies/mL</td>
<td>High</td>
</tr>
<tr>
<td>Bhutan</td>
<td>UNAIDS country progress report</td>
<td>UNAIDS estimate</td>
<td>National programme PLHIV database</td>
<td>National programme PLHIV database</td>
<td>Data not available</td>
<td>Incomplete</td>
</tr>
<tr>
<td>Brazil</td>
<td>National programme report</td>
<td>Sistema de Informacao de Agravos de Notificacao or System for notifiable diseases information (SINAN) and Sistema de Informacao de Mortalidade (SIM)</td>
<td>SINAN and SIM</td>
<td>Sistema de Controle de Medicamentos or Logistics Control System of Medicines (SICOM)</td>
<td>VL &lt;1,000 copies/mL Sistema de Controle de Exames Laboratoriais or System for Laboratory Tests Control (SICEL)</td>
<td>Medium</td>
</tr>
<tr>
<td>China</td>
<td>WHO-UNAIDS meeting presentation</td>
<td>UNAIDS estimate</td>
<td>National Center for AIDS/STI Control and Prevention (NCAIDS) programme data</td>
<td>NCAIDS programme data</td>
<td>VL &lt;1,000 copies/mL NCAIDS programme data (viral load suppression measured from a sub-sample of those on ART)</td>
<td>Medium</td>
</tr>
<tr>
<td>Colombia</td>
<td>UNAIDS report</td>
<td>UNAIDS estimate</td>
<td>Ministry of Health and Social Protection data</td>
<td>UNAIDS Global AIDS response progress reporting</td>
<td>VL &lt;1,000 copies/mL</td>
<td>Medium</td>
</tr>
<tr>
<td>Cuba</td>
<td>WHO report</td>
<td>Ministry of Public Health, HIV Registry Estimated as the difference between HIV Registry (Calculated as everyone diagnosed between 1986 and 2012 minus deaths)</td>
<td>HIV Registry</td>
<td>HIV Registry</td>
<td>Unmeasurable viral load HIV Registry</td>
<td>Medium</td>
</tr>
</tbody>
</table>
Proportion of people living with HIV diagnosed positive

(35 countries)

Proportion of people living with HIV on ART and virally suppressed (35 countries)

Proportion of people living with HIV diagnosed positive versus those on ART (35 countries)

Proportion of people living with HIV on ART versus those with viral suppression

UNAIDS Target: 73%

\[ y = 0.9872x - 0.0785 \]
\[ R^2 = 0.93 \]

ART eligibility criteria versus proportion of people living with HIV with viral suppression

Clearing bottleneck to measure 90-90-90

- Standardize cascade methods
- Make cascades available in public domain
- Improve viral load measurements to be more representative of people on ART
- Move quickly toward cohort and ability to follow patients from diagnosis to viral suppression
- Implement periodic population based surveillance of HIV diagnosis and VL suppression
The translating science to service delivery bottleneck

YEARS
Scientific discovery  New WHO Guidelines  Country adaptation  Finance  Service delivery

How can we accelerate translation?
Objective:
Compare national ART guidelines for 149 countries with WHO 2013 guidelines

Published guidelines from 111 countries and recommendations from 52 countries

UNAIDS regional support team
Web search

AIDSTAR-One database

Ministry of Health officials

Recommendation on ART initiation criteria and monitoring for different target population abstracted

Search end date: September 2015
# ART initiation for asymptomatic people

<table>
<thead>
<tr>
<th>ART initiation criteria</th>
<th>No. of Countries</th>
<th>People with HIV (2014)</th>
<th>Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irrespective of CD4 count</td>
<td>10</td>
<td>2,925,000 (8%)</td>
<td>Australia, Brazil, British Columbia (Canada), France, Korea, Maldives, Mexico, the Netherlands, Papua (Indonesia), Spain, Thailand, US</td>
</tr>
<tr>
<td>Consider for &gt;500</td>
<td>8</td>
<td>142,000 (1%)</td>
<td>Argentina, Austria, Germany, Greece, Guyana, Hong Kong, Italy, Norway</td>
</tr>
<tr>
<td>≤500 WHO recommendation</td>
<td>42</td>
<td>19,485,000 (53%)</td>
<td>Algeria, Bangladesh, Bhutan, Bolivia, Burundi, Cambodia, Cameroon, Chile, Colombia, Democratic Republic of Congo, Ecuador, El Salvador, Fiji, Ethiopia, Gabon, Haiti, Honduras, Kenya, Lesotho, Mali, Madagascar, Malawi, Mauritania, Myanmar, Namibia, Nepal, Oman, Poland, Rwanda, South Africa, South Sudan, Sri Lanka, Sudan, Swaziland, Tanzania, Tunisia, Uganda, Uruguay, Venezuela, Viet Nam, Zambia, Zimbabwe</td>
</tr>
<tr>
<td>≤350 (consider for CD4 ≤ 500)</td>
<td>4</td>
<td>129,000 (&lt;1%)</td>
<td>Belize, Costa Rica, Finland, Guinea</td>
</tr>
<tr>
<td>≤350</td>
<td>34</td>
<td>11,044,000 (30%)</td>
<td>Angola, Benin, Botswana, Britain, Burkina Faso, Canada, China, Cote d’Ivoire, Croatia, Djibouti, Dominican Republic, Ghana, Guatemala, India, Indonesia, Jamaica, Kazakhstan, Malaysia, Moldova, Morocco, Mozambique, Nicaragua, Niger, Nigeria, Panama, Papua New Guinea, Paraguay, Peru, Portugal, Sierra Leone, Sweden, Switzerland, Timor-Leste, Ukraine</td>
</tr>
<tr>
<td>≤300</td>
<td>1</td>
<td>200 (&lt;1%)</td>
<td>Macedonia</td>
</tr>
<tr>
<td>≤200 (consider for CD4 ≤ 350)</td>
<td>6</td>
<td>1,456,000 (4%)</td>
<td>Afghanistan, Belarus, Cape Verde, Cuba, Estonia, Russia</td>
</tr>
<tr>
<td>≤200</td>
<td>6</td>
<td>218,000 (1%)</td>
<td>Comoros, Lao PDR, Liberia, Pakistan, Philippines, Senegal</td>
</tr>
</tbody>
</table>

**Source:** published policy
<table>
<thead>
<tr>
<th>Year</th>
<th>≤ 200</th>
<th>≤ 200 (200-350)</th>
<th>≤ 350</th>
<th>≤ 500</th>
</tr>
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<tbody>
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<td>2003-05</td>
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<td>2006-09</td>
<td>≤200</td>
<td>(200-350)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>≤200</td>
<td>(200-350)</td>
<td>≤350</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>≤350</td>
<td>Ghana, Morocco, Morocco, Nigeria, Malaysia, Panama, Switzerland, Timor-Leste</td>
<td>≤350</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>≤350</td>
<td>Jamaica, Kazakhstan, Malaysia, Panama, Switzerland, Timor-Leste</td>
<td>≤500</td>
<td>Bolivia, Chile, Colombia, DRC, Fiji, Haiti, Ecuador, Ethiopia, Honduras, Madagascar, Mali, Oman, Rwanda, Tunisia, Uganda, Zambia, Zimbabwe</td>
</tr>
<tr>
<td>2013</td>
<td>≤500</td>
<td>Botswana, Benin, China, Peru</td>
<td>≤500</td>
<td>Bangladesh, Bhutan, Burundi, Cameroon, El Salvador, Gabon, Kenya, Malawi, Nepal, Lesotho, Sudan, Uruguay, Mauritania, Poland, Myanmar, Namibia, South Africa, South Sudan, Sri Lanka, Tanzania, Venezuela</td>
</tr>
<tr>
<td>2014</td>
<td>≤500</td>
<td>Costa Rica, Finland</td>
<td>≤500</td>
<td>Angola, Mozambique, Indonesia</td>
</tr>
<tr>
<td>2015</td>
<td>≤500</td>
<td>Cambodia, Swaziland, Viet Nam</td>
<td>≤500</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** published policy
HIV policy is moving to test and treat
Art Initiation Criteria in Africa

2013 WHO Recommendation: CD4 count ≤ 500 cells/mm³

Source: published policy
**Viral Load for ART monitoring (51 countries)**

Source: MSF Issue Brief: Getting to Undetectable
Identified 202 national ART guidelines from 111 countries (96% global burden)

Sources: IAPAC database, AIDSTAR-One database, Internet search, and WHO, UNAIDS, CDC and MoH staff

Reviewed all guidelines for
b. ART eligibility criteria for asymptomatic PLHIV

No. of months taken to adopt WHO guidelines calculated for
b. 41 countries that changed to <500 after WHO 2013 guidelines

Average time to adopt WHO guidelines = \[
\frac{\text{Total months taken to adopt WHO guidelines}}{\text{Total no. of guidelines}}
\]
## Policy Lag

<table>
<thead>
<tr>
<th></th>
<th>WHO 2009 guidelines</th>
<th>WHO 2013 guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date of publication</td>
<td>October, 2009</td>
<td>June, 2013</td>
</tr>
<tr>
<td>ART eligibility criteria recommended</td>
<td>&lt;350 cells/mm(^3)</td>
<td>&lt;500 cells/mm(^3)</td>
</tr>
<tr>
<td>No. of countries that adopted the recommendation</td>
<td>52 (78% burden)</td>
<td>41 (53% burden)</td>
</tr>
<tr>
<td>Average time to adopt the WHO guidelines (Range)</td>
<td>1 year 7 months (1 month – 3 years 9 months)</td>
<td>9 months (1 month – 2 years)</td>
</tr>
<tr>
<td>Countries yet to adopt the recommendation</td>
<td>13 (5% burden)</td>
<td>47 (35% burden)</td>
</tr>
</tbody>
</table>
HIV in South Africa: test and treat starting in 1995

Williams 2010

Accountability and the retrospectoscope
Counseling and testing is feasible and works in a wide variety of settings—need to go to scale
ART policy vs. funding confusion bottleneck

Can we afford to shift policy to meet 90-90-90 targets?

Can we afford not to?
Estimated and projected funding and costs:
We appear to be in the right ball park....

Blue: 17% global funding (UNAIDS)
Brown: 17% projected funding (UNAIDS)
Green: Universal testing + immediate ART
Red: <350 with universal voluntary testing

Annual cost savings
Expanding treatment can save millions of lives and billions of dollars

Potential lives and cost saved by expanding ART in South Africa

PEPFAR 2012 Blueprint: modelling end of AIDS

Uganda Adult HIV Incidence Rate

- Baseline (2011 programmatic levels)
- Combination prevention with treatment scale up (350 scenario)
- Combination prevention with treatment scale up (550 scenario)

PEPFAR Per-Patient ART Cost vs. No. of Direct ART Patients

- 2004: $1,200
- 2010: $600
- 2011: $300

That's a world worth fighting for together.

November 29, 2012
Broad societal benefits of ART (2013)

Broad Societal Benefits of ART

FY2013 Societal Cost Savings Attributable to PEPFAR Investment in ART: $2.8B

- Averted non-ART treatment costs: $434.6M
- Averted orphan care costs: $467.4M
- Averted sexual transmissions: $917.2M
- Averted vertical transmissions: $993.2M

For every 1000 patient-years of treatment:
- 226 patient deaths averted
- 432 children not orphaned
- 60 sexual transmissions of HIV averted
- 39 vertical (mother-to-child) infections averted
- 9 TB cases averted among HIV patients
- 2,419 life-years gained

Source: CDC estimates from the PEPFAR ART Cost Model (PACM) for the Office of the U.S. Global AIDS Coordinator, based on PEPFAR FY2013 APR results
UNAIDS needs estimates

Investments for AIDS response

- 4.9 US$ billion for 2001
- 21.7 US$ billion for 2015
- 32 US$ billion for 2020
Full Package of UNAIDS Fast Track Interventions includes broad traditional response

Source: Jose Antonio Izazola-Licea, What would it take to make 90% of all people living with HIV aware of their own status? Presentation at the Democratizing HIV Testing Conference, Geneva, 18-19 March 2015
A high-level estimate suggests that universal access is affordable, with facility-level ART costs requiring 45-55% of available HIV funding (Ripin, CHAI).

- The funding required to maintain people on treatment does not appear prohibitive: universal access under 2013 guidelines would require ~46% of available HIV funding.
- Moving to the more aggressive goal of 90-90-90 only adds 1.4B more, reaching ~53% of HIV funding.
- Annual testing costs will vary significantly depending on level of targeting and timeline to reach targets.

1. Defined as 81% PLHIV
2. Also includes implementation of Option B+ and treatment for serodiscordant couples.
Global proportion of HIV spending on care and treatment in 39 low- and middle-income countries, 2009-2013

Proportion of HIV spending on care and treatment

60% and more
40% - 60%
<40%

UNAIDS, AIDSinfo
Global leadership opportunity or bottleneck?

- 90-90-90 is complex objective—requires leadership
  - Set the goal: 90-90-90 (accepted?)
  - How to cause change to occur (execution?)
  - How best to involve followers (execution?)
- Establish accountability mechanism
Apollo 13 Strategy:
Houston we have a problem

- Set clear and shared goals
- Identify bottlenecks
- Change business as usual
- Establish accountability and use open data
- Use cascade to measure progress to 90-90-90 target
- Determine costs and benefits of achieving 90-90-90
- Accelerate pace of translating science to service delivery
- Improve leadership, clarity regarding goals, execution and accountability
Thank you

• Somya Gupta
• Jonathan Mermin
• Mike Ruffner
• Brian Williams
• Julio Montaner
• Brad Hersh
• Jose Zuniga
Treatment has a positive economic impact: healthy people go back to work
Antiretroviral Treatment for Prevention of HIV and Tuberculosis
2013 update on current and planned research efforts

Figure 1: Flowchart of literature review process

- Search of electronic databases
  - NIH (n=352)
  - Clinical Trials (n=98)
  - HPTN (n=14)

- Correspondence with researchers (n=20)

- Hand-searching
  - University websites (n=7)
  - Philanthropic organizations (n=10)

- Title review and abstract review (n=501)

Inclusion criteria - Studies evaluating
1. Impact of ART or ART initiation/adherence strategies on transmission, viral load, incidence or risk behavior
2. Impact of early ART (CD4 count ≥ 350 cells/mm³) on morbidity and mortality or HIV transmission

Exclusion criteria
1. Studies focusing on best regimens, medication-assisted therapy, adherence monitoring alone and drug resistance
2. Completed studies, studies with published results, including abstract
3. Purely modeling studies

61 relevant studies included
Global TasP Research Study Sites

**Figure 2:** Map representing countries with studies on early ART for general population and combination HIV prevention programmes.

**Note:** Orange represents countries with more than 10,000 new HIV infections (age 15+) in 2011; the blue dots represent countries conducting research on early ART for general population and the green dots represent countries with combination HIV prevention strategies.

AVAC UNAIDS Report, 2014
Timeline for studies

AVAC UNAIDS Report, 2014
Estimated financial investment in TasP

AVAC UNAIDS Report, 2014
Are these trials ethical given new standard of care?

• Which ones should be stopped and converted to programme implementation?
• How do we ethically conduct PrEP trials in areas with sub-standard care?
• How do we best use these resources to learn how to implement test and treat and other interventions?
At the peak, only about half of UNAIDS’s estimated need would be for treatment.

### 2020 UNAIDS Estimated Resource Needs

<table>
<thead>
<tr>
<th>Category</th>
<th>Enabling Factors</th>
<th>Budget (Billion USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td></td>
<td>$12.5 (40%)</td>
</tr>
<tr>
<td>At-risk pops</td>
<td></td>
<td>$3.4 (11%)</td>
</tr>
<tr>
<td>Enablers/Community activities</td>
<td></td>
<td>$3.7</td>
</tr>
<tr>
<td>Broader health system</td>
<td></td>
<td>$5.8 (18%)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$31.4 (5%)</td>
</tr>
</tbody>
</table>

**Source:** Jose Antonio Izazola-Licea, What would it take to make 90% of all people living with HIV aware of their own status? Presentation at the Democratizing HIV Testing Conference, Geneva, 18-19 March 2015.
What is wrong with this picture?

..and it is not that no one is taking PrEP
HIV treatment reduces viral load and heterosexual transmission (2003)

**HPTN 052 Results**

Prevention of HIV-1 Infection with Early Antiretroviral Therapy

**052: HIV-1 Transmission**

- **Total HIV-1 Transmission Events:** 39

  - **Linked Transmissions:** 28
    - Immediate Arm: 1
    - Delayed Arm: 27
    - \[ p < 0.001 \]
  - **Unlinked or TBD Transmissions:** 11
    - 18/28 (64%) transmissions from infected participants with CD4 > 350 cells/mm³ and VL > 50,000 copies/ml at transmission
    - 23/28 (82%) transmissions in sub-Saharan Africa
    - 18/28 (64%) transmissions from female to male partners

Cohen NEJM 2011
Serodiscordant couples guidelines, 2011 and 2012
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 scaling of ART coverage reduces individual risk of transmission: KZN South Africa

Incidence falls by 1.1% (0.8%-1.4%) for each 1% increase in coverage

Tanser Science 2013; Williams 2013
WHO Option B+ recommendations, 2013
Biomedical interventions for the prevention of HIV transmission
Global AIDS-related death rate per 1000 PLHIV, 2013

Trends in estimated death rate per 1000 PLHIV, 2011-2013

Estimated annual AIDS-related deaths by country, 2013

Fast Track Cities Initiative

MAIRIE DE PARIS

IATAC
INTERNATIONAL ASSOCIATION OF PROVIDERS OF AIDS CARE

UN AIDSMONTHED NATIONS PROGRAMME ON H/WAIDS

UN HABITAT
FOR A BETTER URBAN FUTURE
Re-think how we spend the money
A Five Year Window

Increased Funding Now

10 Million New Infections

Unsustainable

28 MILLION
Total HIV infections averted 2015–2030

Number of new infections (million)

0 2.5

2010 2015 2020 2025 2030

• Ambitious targets
• Constant coverage
Going Forwards, International Donor HIV Assistance has Plateaued

International HIV Assistance from Donor Governments
$USD Billions

<table>
<thead>
<tr>
<th>Year</th>
<th>Committed</th>
<th>Disbursed</th>
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<tbody>
<tr>
<td>2004</td>
<td>$2.8</td>
<td>$3.6</td>
</tr>
<tr>
<td>2005</td>
<td>$3.5</td>
<td>$4.3</td>
</tr>
<tr>
<td>2006</td>
<td>$3.9</td>
<td>$5.6</td>
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<tr>
<td>2007</td>
<td>$4.9</td>
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<tr>
<td>2008</td>
<td>$7.7</td>
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<td>2010</td>
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<tr>
<td>2011</td>
<td>$7.6</td>
<td>$8.8</td>
</tr>
<tr>
<td>2012</td>
<td>$7.9</td>
<td>$8.3</td>
</tr>
</tbody>
</table>

Source: UNAIDS, "Financing the Response to HIV in Low- and Middle-Income Countries", 2013
To get benefits, we would need to scale up ART significantly. At first glance, this appears to be prohibitively costly (Ripin, IAS 2015, CHAI)

People eligible to, and on, ART

Over the past 6 years, however, we have tripled the number of patients on ART while funding levels increased by only 40%. (Ripin, IAS 2015 CHAI)

*Resources available for HIV programs in low and middle income countries. UNAIDS, Global AIDS Gap Reports, 2012 & 2013.*
A high-level estimate suggests that universal access is affordable, with facility-level ART costs requiring 45-55% of available HIV funding (Ripin, CHAI)

**Estimated facility-level ART costs relative to available HIV funding (billion USD)**

- **HIV Testing 90-90-90**: $1.4 billion
- **Universal Access under 2013 guidelines (80% CD4<500)**: $8.9 billion
- **Available for other interventions (e.g. MC, OVC) and management costs**: Remaining Funds

- **The funding required to maintain people on treatment does not appear prohibitive**: universal access under 2013 guidelines would require ~46% of available HIV funding.
- **Moving to the more aggressive goal of 90-90-90 only adds 1.4B more**, reaching ~53% of HIV funding.
- **Annual testing costs will vary significantly depending on level of targeting and timeline to reach targets**.

1. Defined as 81% PLHIV
2. Also includes implementation of Option B+ and treatment for serodiscordant couples.
PEPFAR: We see three categories of efficiencies

System efficiencies
Designing the best overall architecture

Allocative efficiencies
Choosing the right interventions

Operational efficiencies
Working in the right places, in the right way
### Direct testing and treatment spending per patient averages ~$540…

<table>
<thead>
<tr>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Botswana 0.2</td>
<td>$1,195</td>
<td>$244</td>
</tr>
<tr>
<td>Ivory Coast 0.1</td>
<td>$1,140</td>
<td>$254</td>
</tr>
<tr>
<td>Tanzania 0.6</td>
<td>$863</td>
<td>$278</td>
</tr>
<tr>
<td>Mozambique 0.6</td>
<td>$666</td>
<td>$128</td>
</tr>
<tr>
<td>Kenya 0.7</td>
<td>$628</td>
<td>$374</td>
</tr>
<tr>
<td>Zambia 0.6</td>
<td>$544</td>
<td>$359</td>
</tr>
<tr>
<td>South Africa 2.8</td>
<td>$488</td>
<td>$154</td>
</tr>
<tr>
<td>Nigeria 0.7</td>
<td>$458</td>
<td>$288</td>
</tr>
<tr>
<td>Ethiopia 0.3</td>
<td>$432</td>
<td>n/a</td>
</tr>
<tr>
<td>Zimbabwe 0.7</td>
<td>$356</td>
<td>$262</td>
</tr>
<tr>
<td>Malawi 0.5</td>
<td>$183</td>
<td>$184</td>
</tr>
</tbody>
</table>

**Weighted avg.** $540

Source: PEPFAR COPs; National NASAs. Note: Direct spending numbers are derived from NASAs, most (but not all) dating from 2012; Most (but not all) commodity spending numbers date from 2014. Direct spending totals include those for clinical care, community care, PMTCT, HTC, and Labs; excludes HSS, program management, key pops, and surveillance. Country spending averages have been calculated by dividing the specific total dollar spend into the reported program size (from UNAIDS) for the relevant year.
HIV spending on care and treatment per person living with HIV vs. per capita income

- Low-income countries:
  - Malawi
  - Mozambique
  - Zimbabwe
  - DRC
  - Togo
  - CAR
  - Guinea
  - Burundi
  - Angola
  - CAR
  - Chad
  - Myanmar
  - South Sudan

- Middle-income countries:
  - Brazil
  - Colombia
  - Thailand
  - Namibia
  - Botswana
  - Swaziland
  - Ukraine
  - South Africa
  - Indonesia
  - Nigeria
  - Zambia
  - Korea
  - Vietnam
  - India

Equation:

\[ y = 0.4695x + 0.6315 \]

\[ R^2 = 0.2054 \]

Legend:

- Low-income countries
- Middle-income countries

Data points:

- $10
- $100
- $900
- $1,045
- $12,745
Be Attentive to Marginal Costs!

50% higher cost of achieving Fast Track using 2012 Average Cost vs using Marginal Cost

- Total Cost adding Marginal Costs
- Total Cost Using Fixed Average Cost
South Africa: Significant Economies of Scale Leads to Decreased Cost
Treatment has a positive economic impact: healthy people go back to work

Source: Barnighausen T et al. The economic benefits of ART: evidence from a complete population cohort in rural South Africa. 2nd International HIV Workshop on Treatment as Prevention, Vancouver, Canada, 22-25 April 2012.
Treatment serves as a bridge to the end game

• Vaccine
• Cure
• ????
However beautiful the strategy, you should occasionally look at the results

--Winston Churchill
Ending AIDS is feasible:

• We have the tools
• Set ambitious targets to realize potential
• Work with community to reach everyone living with HIV to prevent illness, death and transmission
• Global solidarity to finance scale up—focus resources to ensure efficiency and impact
• Mind the Innovation Chasm—we will need optimal diffusion for success
Thank you

- Mike Ruffner (OGAC)
- David Ripin (CHAI)
- Somya Gupta (IAPAC)
- Brad Hersh (UNAIDS)
- Jose Zuniga (IAPAC)
- Brian Williams (SACEMA)