Getting to Zero: The Long and Winding Road

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The Road to Getting to Zero Begins with Getting to Ten: It is Scenic and Has Many Detours
Progress Toward 90-90-90: PEPFAR

Figure 1. Achieving Epidemic Control - Astounding Results from Swaziland, Zimbabwe, Malawi, Zambia, Uganda, and Lesotho Source: PHIA 2015-17

<table>
<thead>
<tr>
<th>Age Groups (years)</th>
<th>Aware of HIV Status</th>
<th>Treated</th>
<th>Virally Suppressed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swaziland 15+ (2016)</td>
<td>85</td>
<td>87</td>
<td>92</td>
</tr>
<tr>
<td>Lesotho 15-59 (2017)</td>
<td>77</td>
<td>90</td>
<td>88</td>
</tr>
<tr>
<td>Zimbabwe 15-64 (2015)</td>
<td>74</td>
<td>87</td>
<td>86</td>
</tr>
<tr>
<td>Malawi 15-64 (2015)</td>
<td>73</td>
<td>89</td>
<td>91</td>
</tr>
<tr>
<td>Zambia 15-64 (2015)</td>
<td>67</td>
<td>85</td>
<td>89</td>
</tr>
<tr>
<td>Uganda 15-64 (2017)</td>
<td>66</td>
<td>88</td>
<td>83</td>
</tr>
</tbody>
</table>

1 Botswana, Côte d’Ivoire, Haiti, Kenya, Lesotho, Malawi, Namibia, Rwanda, Swaziland, Tanzania, Uganda, Zambia, and Zimbabwe.
Progress is Variable

CASCADe PROGRESS VARIES AMONG REGIONS

![Graph showing cascade progress varies among regions with data from UNAIDS 2017.](image)

FIGURE 3.3. KNOWLEDGE OF HIV STATUS, TREATMENT COVERAGE AND VIRAL LOAD SUPPRESSION, BY REGION, 2016

1. Measuring the Targets is Challenging and Inconsistent, as is the Presentation of Them
Fig 1. Search flow diagram. WHO, World Health Organization; UNAIDS, Joint UN Programme on HIV/AIDS; PEPFAR; the US President’s Emergency Plan for AIDS Relief. For 2015–2016, we searched PubMed, UNAIDS and WHO reports, national surveillance and program reports, PEPFAR 2016 Country Operational Plans, and conference presentations and/or abstracts for national HIV care continua. The search strategy included the keywords (HIV OR AIDS) AND (treatment) AND (cascade OR continuum of care OR care continuum OR continuum OR spectrum of care OR 90-90-90 OR viral suppression) for data published in the public domain. The search was designed to identify the most recent officially reported or sanctioned national continuum of care available in the public domain. Search inclusive of results as of November 30, 2016.
doi:10.1371/journal.pmed.1002553*g001

## Documenting and Grading Continua Methods

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Estimated People Living with HIV</th>
<th>People Living with Diagnosed HIV</th>
<th>People Receiving ART</th>
<th>People on ART with Suppressed Viral Load</th>
<th>Quality</th>
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<tr>
<td>Antigua and Barbuda</td>
<td>Newspaper article</td>
<td>Data not available</td>
<td>National program data</td>
<td>Data not available</td>
<td>Incomplete</td>
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<td>UNAIDS country program report</td>
<td>UNAIDS estimate</td>
<td>National program data</td>
<td>Data from AIDS Direction</td>
<td>VL &lt; 100 copies/mL</td>
<td>Data from AIDS Direction</td>
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<tr>
<td>Brazil</td>
<td>National program report</td>
<td>National program data</td>
<td>RAIDS (Ministry of Health), estimations in sentinel and private health facilities</td>
<td>RAIDS (Ministry of Health)</td>
<td>VL &lt; 100 copies/mL</td>
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<td>Canada</td>
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<td>National program data</td>
<td>RAIDS, Estimation of ART coverage</td>
<td>RAIDS, Estimation of ART coverage</td>
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<tr>
<td>Trinidad and Tobago</td>
<td>National program data</td>
<td>National program data</td>
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</tr>
</tbody>
</table>

2. 90-90-90 is Really 90-81-73

Target 1: 90% of HIV+ people diagnosed
- 36.9 million

Target 2: 90% of diagnosed people on ART
- 33.2 million

Target 3: 90% of people on ART with HIV RNA suppression
- 29.5 million

Viral Suppression
- 26.9 million
Targets and Cascades Are Not the Same Things

3. The First Goal is the Hardest to Achieve; and Everything Else Depends on It
90% Of People Living With HIV Will Know Their HIV Status

CDC Estimates of Undiagnosed in the U.S.

Estimated HIV prevalence among persons aged ≥13 years and percentages of persons living with undiagnosed HIV infection, by transmission category, United States, 2014

<table>
<thead>
<tr>
<th>Transmission category</th>
<th>HIV prevalence</th>
<th>Persons living with undiagnosed HIV infection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>95% CI</td>
</tr>
<tr>
<td>Total</td>
<td>1,107,700</td>
<td>(1,088,500, 1,127,000)</td>
</tr>
<tr>
<td>Male-to-male sexual contact</td>
<td>615,400</td>
<td>(600,900, 629,900)</td>
</tr>
<tr>
<td>Injection drug use</td>
<td>139,700</td>
<td>(133,300, 146,100)</td>
</tr>
<tr>
<td>Male-to-male sexual contact and injection drug use</td>
<td>56,600</td>
<td>(52,900, 60,200)</td>
</tr>
<tr>
<td>Heterosexual contact</td>
<td>296,100</td>
<td>(286,300, 306,000)</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.
Note: Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis.

a Adjusted for missing risk factor information. Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.
Not Just Undiagnosed: Late Diagnosis, Too
4. The Targets Leave Behind 10/10/10 or 10/20/30
Who Are the Missing 10/10/10 (Or 10/20/30)?

- 90% of all living with HIV will know their HIV status
- 90% of all living with HIV will receive antiretroviral therapy
- 90% of all receiving antiretroviral therapy will have viral suppression
Mental & Sexual Health Risk among Transgender Women in Lebanon

- 10% HIV prevalence
- 57% CRAI in past 3 months (40% unknown status)
- 68% current sex work
- 40% no prior HIV testing
- 68% physical violence
- 32% police arrest because of gender presentation
- 98% gender presentation-related discrimination
- 46% attempted suicide


Disparities in the 10/10/10

• Even in the most HIV-focused, resource-rich settings, making significant progress in their epidemics, there are notable disparities. In San Francisco, e.g.:
  • African-Americans are disproportionately diagnosed late and have poorer treatment and care outcomes, including poorer survival rates than other racial/ethnic groups
  • Latinos are most likely to be uninsured at diagnosis and less likely to be engaged in care and virally suppressed than whites
  • Asians & Pacific Islanders are most likely to be diagnosed late
  • Younger people less engaged in care and virally suppressed
  • Women and transwomen are less likely to achieve viral suppression than males
  • Women and people who inject drugs have poorer survival rates than others
  • Persons experiencing homelessness are less engaged in care and virally suppressed than those stably housed
5. 90/90/90 Targets & Care Continua are Focused on Treatment; Treatment is Necessary, but Not Sufficient, to Get to Zero
Beyond Viral Suppression

Source: Jeffrey Lazarus, PhD, ISGlobal, Hospital Clinic, University of Barcelona; reproduced by Emily Newman, For people with HIV, what’s next after viral suppression? BETA October 3, 2017.
Declining HIV Diagnoses in Gay Men in UK

Figure 1. New HIV diagnoses in the UK, by risk group, 2007-2016, United Kingdom

3 October 2017
Declining HIV Incidence in San Francisco

NEW HIV DIAGNOSES IN SAN FRANCISCO OVER THE LAST 10 YEARS

Source: HIV Epidemiology Annual Report 2016, San Francisco Dept. of Public Health, Pop. Health Division

- 2007: 532
- 2008: 518
- 2009: 470
- 2010: 459
- 2011: 421
- 2012: 453
- 2013: 392
- 2014: 311
- 2015: 265
- 2016: 223

sfaf.org
Treatment Scale-up Does Not Necessarily = Reduced Incidence

• 30% increase in ART coverage in East and Southern Africa from about 24% in 2010 to about 54% in 2015
  • Resulted in 36% decrease in annual HIV-related deaths
  • But no significant decline in estimated adult new HIV infections. *(UNAIDS 2016)*

• UTT study in rural South Africa (ANRS 12249 TasP trial) found no reduction in HIV incidence following intervention *(Iwuji et al. AIDS 2016)*

• In cities, such as Amsterdam, London, and Paris, where 90-90-90 targets have been reached, a reduction in HIV incidence has not been shown across the board *(Baggely et al. JIAS 2016)*

• Population-level declines in incidence mask sub-group increases
Reductions in HIV Incidence: Off Target

**Figure 2.4. New HIV Infections, All Ages, Global, 1990-2016 and 2020 Target**

Source: UNAIDS 2017 estimates.

*The 2020 target is fewer than 500,000 new HIV infections, equivalent to a 75% reduction since 2010.

Regional Differences in HIV Incidence Reductions

![Graph showing regional differences in new HIV infections](image)

**Figure 2.7. New HIV Infections, All Ages, by Region, 1990-2016**

Source: UNAIDS 2017 estimates.

The U.S. Example

Estimated annual HIV infections in the U.S. declined 18%
Between 2008 - 2014 infections fell from 45,700 to 37,600

Gay and bisexual men remain most affected

37,600
New HIV Infections in 2014

Gay and bisexual men aged 13-24 years
18%
1,100 infections

Gay and bisexual men aged 35-44 years
26%
8,600 infections

People who inject drugs
5%
1,700 infections

Heterosexuals
23%
8,600 infections

Gay and bisexual men
26,200 infections
70%
HIV Incidence Disparities: Transmission Category

Estimated HIV incidence among persons aged ≥13 years, by transmission category, United States, 2008–2014

- Total
- Male-to-male sexual contact (MSM)
- Heterosexual contact
- Injection drug use (IDU)
- MSM/IDU

Note: Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis.

*Adjusted for missing risk factor information. Heterosexual contact with a person known to have, or to be at high risk for, HIV infection.

*Estimated annual percentage change is different from zero at the 5% significance level.
HIV Incidence Disparities Within G/MSM by Age

Estimated HIV incidence among men who have sex with men\textsuperscript{a}, aged ≥13 years, by age, United States, 2008–2014

Note: Data include persons with a diagnosis of HIV infection regardless of stage of disease at diagnosis. Age is in years.
\textsuperscript{a}Adjusted for missing risk factor information.
\textsuperscript{b}Estimated annual percentage change is different from zero at the 5% significance level.
HIV Incidence Disparities Within G/MSM By Race

S. Singh, CROI 2017 Abstract #30
6. 90-90-90 Targets Focus on HIV-infected People; But HIV-uninfected People Also Matter; and PrEP is not the only Prevention Strategy for Them
Race & Gender Disparities in PrEP Use in the U.S.

Total = 49,158 between 2012 & 2015
523% increase between 2013 & 2015
Of 44% with race/ethnicity data:
• Whites = 74%
• Hispanics = 12%
• African Americans = 10%
• Asians = 4%
• % African American dropped from 12% to 10%
• % Women declined from 49% to 11%
• Black women 4x less likely than white women
8% < 25 years old.

Lack of Awareness is Barrier to PrEP Uptake Among Women

Knowledge, Attitudes, and Likelihood of Pre-Exposure Prophylaxis (PrEP) Use Among US Women at Risk of Acquiring HIV

Judith D. Auerbach, PhD; Suzanne Kinsky, MPH; Gina Brown, MSW; and Vignettta Charles, PhD.

Perspectives on HIV Prevention Among Urban Black Women: A Potential Role for HIV Pre-Exposure Prophylaxis

Charlene A. Rian, MD, MPH; Valerie E. Stone, MD; MPH; Jennifer A. Mitty, MD, MPH; Matthew J. Mimiaga, ScD, MPH; Kathryn T. Hall, PhD; Douglas Krakower, MD; and Kenneth H. Mayer, MD.

HIV risk and awareness and interest in pre-exposure and post-exposure prophylaxis among sheltered women in Miami

Susanne Dobleccki-Lewis, Larissa Lester, Bryanna Schwartz, Constance Collins, Ral Johnson and Erin Kobetz

Awareness of pre-exposure prophylaxis (PrEP) among women who inject drugs in NYC: the importance of networks and syringe exchange programs for HIV prevention

Suzan M. Walters, Kathleen H. Reily, Alan Neajlov and Sarah Baunsteent
Comprehensive HIV Prevention Process Model

7. Getting to Zero Requires More than Scale-up and Implementation Science
Need to Understand and Address Co-occurring Conditions, Stigma & Discrimination, and Policy Shifts
Need to Navigate Complex Environments
From 10/20/30 to Zero in . . . .
Strategic Priorities for San Francisco Getting to Zero Consortium

City-wide coordinated PrEP program

Rapid ART start with treatment hubs

Linkage-engagement-retention in care

Reducing HIV stigma

Committee for each initiative develops prioritized action plan, metrics and milestones.

- Drug user health
- Mental health/Substance use/Housing as HIV prevention
- Linkage to care and partner services (LINCS)
- Treatment as prevention
- Primary care HIV screening

- Syringe access
- Health ed/risk reduction
- STD testing & treatment
- Prevention with positives
- HIV testing
The Centers for Disease Control and Prevention reported an 18 percent reduction nationally in new HIV infections over six years (from 2008 to 2014), while San Francisco reports a 16 percent reduction last year alone, and a 49 percent reduction in the past four years (from 2012 to 2016).
Progress in the HIV Continuum: S.F.

Hessol, CROI 2017
Abstract #910
If all goes well, when we get to zero, we can say . . .
8. $90-$90-$90: Success Requires Sustained Funding
Cost and Funding

- Unaffordable drug prices are a major barrier to achieving the 90-90-90 goals

- Large increases in treatment coverage will require medicine prices to be cut

- Countries and donors should aim for a new $90-$90-$90 target on HIV, viral hepatitis and TB drug prices – Andrew Hill, University of Liverpool

- Analysis of prices paid for the raw materials and manufacturing costs of drugs

- This shows that each disease can be treated for $90 per year, as long as generics are used and prices are effectively negotiated

- Patents have expired on TDF, 3TC, and EFV worldwide – this combination should be available in all countries for less than $90 per year

- Generic drugs, government commitment, price negotiation, civil society mobilisation and advocacy are important tools to reduce treatment costs

<table>
<thead>
<tr>
<th>DRUG</th>
<th>CALCULATED TARGET (ESTIMATED ANNUAL PRICE)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atazanavir</td>
<td>$126</td>
</tr>
<tr>
<td>TDF/FTC/EFV</td>
<td>$78</td>
</tr>
<tr>
<td>TDF/3TC/EFV</td>
<td>$82</td>
</tr>
<tr>
<td>Sofosbuvir</td>
<td>$42</td>
</tr>
<tr>
<td>TB: RHZE</td>
<td>$38</td>
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</table>

Adapted from IAS 2017 Toolkit Track D
US Funding Decisions

- US government funding underpins the global AIDS response: PEPFAR and Global Fund
- President Trump’s 2018 budget proposals would cut the US foreign aid budget by one-third
- Modelling study of impact of US funding decisions on epidemic in sub-Saharan Africa
- If US funding doesn’t increase, no further progress to second 90 and third 90
- Worst-case scenario: a withdrawal of US funding from Global Fund and PEPFAR – up to 7.9 million more HIV infections and around 300,000 AIDS deaths by 2030
- However, modelling shows that 90-90-90 can be achieved by 2020 with a combination of increased US funding, increased domestic funding and more efficient allocation of funding

Adapted from IAS 2017 Toolkit Track D
Conclusion: How to Reduce Our Travel Time

• Be clear and consistent about what we are measuring in our care continua to be sure our claims about progress towards the targets are substantiated.

• Focus much more energy on HIV testing, including repeat testing to optimizing prevention and treatment outcomes.

• Conduct more basic social research to understand the basis and persistence of HIV-associated disparities and to inform effective mitigation/elimination strategies.

• Acknowledge that ART for treatment and prevention is necessary, but not sufficient.

• Don’t forget primary prevention, including, but not limited to PrEP, for HIV-uninfected persons.

• Remember that environments are not static—witness the current political and budgetary climate in the U.S.—so our responses can’t be either.

• Develop and support local efforts that are bold, comprehensive, multi-sectoral, and adaptive to change.
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