Connecting the dots from 90-90-90 to HIV Epidemic Control: Milestones for the climb up Mt. Everest

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Chair: WHO Strategic and Technical Advisory Committee for HIV
Chair: UNAIDS Scientific Expert Panel
Overview

• The HIV epidemic at a glance

• UNAIDS 2030 Goal: Ending AIDS as a public health threat – epidemic control

• Are we on the right path to epidemic control with 90-90-90 treatment targets?

• Connecting the dots to Epidemic Control…
Global HIV epidemic at a glance…

In 2016, worldwide there were:

37 million living with HIV

1 million HIV deaths

1.8 million new infections

Source: UNAIDS Global Report 2017
### Top 15 countries: People living with HIV

<table>
<thead>
<tr>
<th>Rank</th>
<th>Country</th>
<th>% of people with HIV in the world</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>South Africa</td>
<td>18%</td>
</tr>
<tr>
<td>2</td>
<td>Nigeria</td>
<td>9%</td>
</tr>
<tr>
<td>3</td>
<td>India</td>
<td>6%</td>
</tr>
<tr>
<td>4</td>
<td>Kenya</td>
<td>5%</td>
</tr>
<tr>
<td>5</td>
<td>Mozambique</td>
<td>4%</td>
</tr>
<tr>
<td>6</td>
<td>Uganda</td>
<td>4%</td>
</tr>
<tr>
<td>7</td>
<td>Tanzania</td>
<td>4%</td>
</tr>
<tr>
<td>8</td>
<td>Zimbabwe</td>
<td>4%</td>
</tr>
<tr>
<td>9</td>
<td>USA</td>
<td>4%</td>
</tr>
<tr>
<td>10</td>
<td>Malawi</td>
<td>3%</td>
</tr>
<tr>
<td>11</td>
<td>Zambia</td>
<td>3%</td>
</tr>
<tr>
<td>12</td>
<td>China</td>
<td>2%</td>
</tr>
<tr>
<td>13</td>
<td>Ethiopia</td>
<td>2%</td>
</tr>
<tr>
<td>14</td>
<td>Russia</td>
<td>2%</td>
</tr>
<tr>
<td>15</td>
<td>Brazil</td>
<td>2%</td>
</tr>
</tbody>
</table>

Remaining countries: 27%
Great progress on increasing ART coverage… but…

Number of people receiving ART globally rose from ~2 million in 2005 to ~21 million in 2017

Even with 21 million on ART, much has been done – but even more still needs to be done!

Sources: Global AIDS Response Progress Report; UNAIDS update 2017
But, globally HIV prevention is lagging…

5% reduction in new infections 2013 - 2016

<table>
<thead>
<tr>
<th>Year</th>
<th>New HIV infections among adults (15+)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>3.0 million (2020 Target)</td>
</tr>
<tr>
<td>1995</td>
<td>3.3 million</td>
</tr>
<tr>
<td>2000</td>
<td>3.0 million</td>
</tr>
<tr>
<td>2005</td>
<td>2.7 million</td>
</tr>
<tr>
<td>2010</td>
<td>2.5 million</td>
</tr>
<tr>
<td>2015</td>
<td>2.3 million</td>
</tr>
<tr>
<td>2020</td>
<td>2.0 million</td>
</tr>
<tr>
<td>2025</td>
<td>1.8 million</td>
</tr>
<tr>
<td>2030</td>
<td>1.5 million</td>
</tr>
</tbody>
</table>

Source: Adapted from UNAIDS Fast-track Report
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Epidemic control - UNAIDS 2030 goal

- UNAIDS 2030 goal - “The End of AIDS as a Public Health Threat”

- Epidemic control: Reduction of disease incidence, prevalence, morbidity or mortality to a locally acceptable level as a result of deliberate intervention measures. Mathematically defined as the reproductive rate of infection ($R_0$) below 1

- Some suggest - incidence rate of 1/10,000 pa indicates epi control

- UN Declaration 2030 - 90% decline in HIV incidence since 2010

The world is embarking on a Fast-Track strategy to end AIDS epidemic by 2030. To reach this visionary goal…countries will need to use the powerful tools available, hold one another accountable for results and make sure that no one is left behind.
Epidemic Control: the base-camp milestone on the route to the Mount Everest summit of Ending AIDS
Our chosen path to epidemic control (base camp): 90-90-90

Why we chose a treatment target (90-90-90)?
Modelling evidence: Universal Test & Treat can eliminate HIV transmission (End AIDS)

Universal voluntary HIV testing with immediate antiretroviral therapy as a strategy for elimination of HIV transmission: a mathematical model

Reuben M Granich, Charles F Gilks, Christopher Dye, Kevin M De Cock, Brian G Williams

Using data from South Africa, mathematical models show how a test and treat strategy could have a major effect on severe generalised HIV/AIDS epidemics
Clinical Trial evidence: ART prevents HIV transmission in discordant couples

Antiretroviral Therapy for the Prevention of HIV-1 Transmission


Implementation evidence: High ART coverage ↓ HIV risk and ↑ life expectancy

High Coverage of ART Associated with Decline in Risk of HIV Acquisition in Rural KwaZulu-Natal, South Africa
Frank Tanser,1,2 Till Bärnighausen,1,2 Erofili Grapsa,4 Jaffer Zaidi,1 Marie-Louise Newell3,3

Increases in Adult Life Expectancy in Rural South Africa: Valuing the Scale-Up of HIV Treatment
Jacob Bor,1,2* Abraham J. Herbst,3 Marie-Louise Newell1,3 Till Bärnighausen1,2

Adult life expectancy increased from 49.2 years in 2003 to 60.5 years in 2011
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Questioning whether the 90-90-90 UNAIDS target achieves epidemic control

Is the UNAIDS target sufficient for HIV control in Botswana?

Salim Abdool Karim
Centre of AIDS Programme of Research in South Africa, Durban,

Botswana’s progress toward achieving the 2020 UNAIDS 90-90-90 antiretroviral therapy and virological suppression goals: a population-based survey

2016: Impact of Test & Treat on HIV incidence in a KZN – ANRS 12249 TasP

Control

Treatment by CD4 (N = 14 916)
HIV incidence: 2.27%

TasP

Test & Treat (N = 13 239)
HIV incidence: 2.13%

No reduction in HIV incidence from 6 monthly HIV testing & treatment (adjusted relative risk: 0.96 [CI: 0.83 to 1.10])

Whither UTT* with a 90-90-90 target?

- The scientific rationale is sound
- Practical implementation challenging
  - In Botswana, migrants excluded from the study
  - In KwaZulu-Natal, poor linkage to care
- Can we reduce HIV incidence to reach epidemic control with treatment scale-up?
  - Awaiting SEARCH results at IAS Amsterdam
  - Awaiting PopArt trial results at CROI 2019
- For now, how much do we know about the obstacles to 90-90-90 and beyond?

*UTT = Universal HIV test & treat
Knowledge of HIV status, treatment coverage & viral load suppression, 2016

Central Africa: low HIV testing rates

Challenge reaching men & ART adherence in adolescents

Source: UNAIDS
Knowledge of HIV status, treatment coverage & viral load suppression, 2016

Eastern Europe/central Asia: poor linkage to care

Challenge reaching men & ART adherence in adolescents

Source: UNAIDS
Knowledge of HIV status, treatment coverage & viral load suppression, 2016

N Africa/M East: poor adherence & viral suppression

Challenge reaching men & ART adherence in adolescents

Source: UNAIDS
In generalised epidemics: Young women: biggest global challenge to prevention

Transmission networks and risk of HIV infection in KwaZulu-Natal, South Africa: a community-wide phylogenetic study


HIV prevalence in 2 year age bands in 2014/5 in rural KZN, n=9,812
In concentrated epidemics: Concerning rise in new HIV infections among key populations eg. PWID in Russia

Source: UNAIDS
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How do we know whether we are on the right path to epidemic control?

UNAIDS consultation in Glion, Switzerland
Glion - What indicators can we use to determine if we are on the right path & know when we have reached epidemic control?

1. 90% reduction in new infections (baseline: 2010)
2. Incidence rate of <1 per 1,000 / 10,000 / 100,000
3. New cases / all-cause deaths in people with HIV
4. Incidence / Prevalence ratio (New cases / PLHIV)
   IPR: is most compelling epidemiologically

Note: These 4 are not mutually exclusive

Shortcoming: All need accurate measure of new cases (incidence)
Why bother with milestones & targets?

• Need a shared view of what we are trying to achieve and how much progress has been made

• Avoid public perception that we reached the summit when we have not even made it to base camp

“…The AIDS response has now become a victim of its successes … impression that the epidemic is no longer important or urgent. Commitment to HIV is slowly dissipating as the world’s attention shifts elsewhere. Complacency is setting in.

However, nearly 5,000 new cases occur each day, defying any claim of a conquered epidemic.

…no room for complacency when so much more remains to be done”
Conclusion

Connecting 90-90-90 → Epidemic control → “The End of AIDS”

• “The End of AIDS” is an aspirational vision (Summit) similar to the epidemiological concepts of *elimination* & *eradication* - not applicable to AIDS now as millions living with HIV & no cure available

• Epidemic control is the current milestone to reach

• 90-90-90 is chosen path for now until better ones…

• Incidence rates & IPR used to indicate whether the chosen path is correct & going to epidemic control

• Clear messaging on progress achieved and tasks remaining - to overcome & prevent complacency