HIV Drug Resistance
Time to act is now

Silvia Bertagnolio, MD
HIV Drug Resistance
World Health Organization
## Global summary of the AIDS epidemic | 2015

### Number of people living with HIV in 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>36.7 million</td>
<td>[34.0 million – 39.8 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>31.8 million</td>
<td>[30.1 million – 33.7 million]</td>
</tr>
<tr>
<td>Women</td>
<td>16.0 million</td>
<td>[15.2 million – 16.9 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>3.2 million</td>
<td>[2.9 million – 3.5 million]</td>
</tr>
</tbody>
</table>

### People newly infected with HIV in 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
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<tbody>
<tr>
<td>Total</td>
<td>2.1 million</td>
<td>[1.9 million – 2.4 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>1.9 million</td>
<td>[1.7 million – 2.1 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>240 000</td>
<td>[210 000 – 280 000]</td>
</tr>
</tbody>
</table>

### AIDS deaths in 2015

<table>
<thead>
<tr>
<th>Category</th>
<th>Total</th>
<th>Range</th>
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<tbody>
<tr>
<td>Total</td>
<td>1.1 million</td>
<td>[940 000 – 1.3 million]</td>
</tr>
<tr>
<td>Adults</td>
<td>1.3 million</td>
<td>[1.2 million – 1.5 million]</td>
</tr>
<tr>
<td>Children (&lt;15 years)</td>
<td>190 000</td>
<td>[170 000 – 220 000]</td>
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</tbody>
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**World Health Organization**
Increase in people receiving ART over time

People living with HIV on antiretroviral therapy (Millions)


Numbers on antiretroviral treatment (all ages) 2020 target

18.2 [16.1 – 19.0] million
ART coverage over time

- 3% (2000)
- 3% (2001)
- 3% (2002)
- 4% (2003)
- 5% (2004)
- 7% (2005)
- 9% (2006)
- 12% (2007)
- 16% (2008)
- 20% (2009)
- 23% (2010)
- 27% (2011)
- 32% (2012)
- 37% (2013)
- 42% (2014)
- 46% (2015)

World Health Organization
Globally, improvements are needed at each stage of the cascade of HIV testing and treatment services, 2015

- **Target 1**: 90% of people living with HIV know their HIV status (90%)
- **Target 2**: 90% of people who know their HIV-positive status are accessing treatment (81%)
- **Target 3**: 90% of people receiving treatment have suppressed viral loads (73%)

- **People living with HIV**: 36.7m
- **People living with HIV who know their status**: 22.2m (60%)
- **People living with HIV who are receiving ART**: 17.0m (46%)
- **People living with HIV who are virally suppressed**: 13.8m (38%)
Encouraging results from 3 key African countries (Dec 2016)

Average of 65% community viral load suppression in all HIV-infected adults, approaching the 73% target of the 90/90/90 goals.

In adolescents and young people in these same countries, the average community viral load suppression was lower (42%)

Source: 2016 PEPFAR’s Population-based HIV Impact Assessments (PHIA)
Looking ahead to reach the 90 90 90 targets

To sustain the gains made in adults, and to reach the targets of 90 90 90 and end the AIDS epidemic, we must urgently continue to focus on HIV prevention and treatment, particularly among young people, and to prevent and respond to HIVDR
Early Warning Indicators of HIVDR
2016 WHO Global Report

59 countries - 7351 ART sites - 1,121,537 patients (2004-2014)

Countries (n=59) monitoring one or more WHO Early Warning Indicator of HIV drug resistance, 2004–2014

- ARVs stock out
- Retention in care at 12 months
- Lost to follow up at 12 months
- Appropriate prescribing practices
- VL testing coverage
- VL suppression
- On time pill pick up
The expansion of routine viral load needs to continue: policy into practice, July 2016

Routine viral load is fully implemented in 47% of LMIC and partially implemented in 26% of LMIC.
Before ART initiation

Routine HIVDR testing in LMIC, December 2015

1st line failure  2nd line failure

- Routine for all (1st line failure)
- Not done/not reported
- Routine for all (2nd line ART)
- Not done or not reported
Impact of Treat All (and likely PrEP..) on Levels of HIVDR

- Number of new HIV infections
- Increase the risk of HIVDR in people infected despite the use of ARVs

Nichols et al. AIDS 2014
Low Level of Pre-Treatment Resistance in LMIC In The Fist 10 Years After Roll Out

<table>
<thead>
<tr>
<th></th>
<th>7%</th>
<th>7%</th>
<th>7.4%</th>
<th>6.8%</th>
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</table>

Sub-Saharan Africa

R. Hamers, Lancet ID, 2011
Soo-Yon Rhee et al, PLOS Medicine 2015
Recent signals of high levels of pre-treatment resistance

HIVDR in ARV-Naïve in LMIC, by year of specimen collection (2010-2016)

Data source: nationally representative surveys; published studies; personal communications
HIVDR associated with increased HIV mortality

- Pre-treatment HIVDR predicted to be associated with a significant increase in HIV-related mortality (Cambiano et al. JID 2013)
- Higher mortality in patients with HIVDR at failure (HR = 2.08; 95% CI: 1.07 to 4.07) (Pinoges L, et al. JAIDS 2015)

Pre-treatment HIVDR increases the risk of virological failure 3 times

- **Asian cohort**: in patients with PDR to at least 1 drug used in 1st line ART the risk of VF is **3.12-fold higher** [OR = 3.12, 95%CI (1.31-7.43), p=0.010]. (Phanuphak P, et al. JAIDS 2014)
- **European multicohort**: in patients with TDR to at least one drug in the 1line ART the HR of VF after 12 months is **3.13** (95%CI 2.33-4.20) (Wittkop et al. Lancet Inf Dis 2011)
- **African multicohort**: in patients with at least 1 ‘suboptimal’ drug, the OR of VF after a mean follow-up of 12 months is **2.13** (95% CI 1.44-3.14; p<0.0001) (Hamers RL et al, Lancet Infect Dis. 2012)
Resistance is a threat to programme sustainability

As PDR increases, more **people will require costly second-line ART regimens.**

**HIVDR is a threat to the efficiency and cost-effectiveness of HIV programs.**

With higher levels of HIVDR, more resources would be needed to treat the same number of patients, or more likely, fewer patients could be treated with the same resources.
Global Action Plan on HIVDR:

A framework for a collective action to monitor, prevent and respond to HIVDR emergence and transmission over the next 5 years