

KNOWLEDGE IS POWER

KNOW YOUR STATUS,
KNOW YOUR VIRAL LOAD



Mandisa Dukashe and her family live in Eastern Cape, South Africa. Mandisa is a trained nurse and works in the response to HIV to ensure quality control in health-care settings. She is living with HIV and encourages people to get tested for HIV. Her husband and two daughters are all HIV-negative.

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FOREWORD

Increasingly when I meet people living with HIV, I am hearing about the importance of HIV testing being freely available by anyone who wants to know their HIV status. And I am hearing how important it is to keep HIV suppressed.

Having an undetectable viral load—a level of HIV in a person’s blood so low that it can’t be detected—is vital. It improves the health of people living with HIV and reduces deaths. People with sustained viral load suppression have effectively no risk of sexually transmitting the virus to a partner who is HIV-negative.

I have seen the successes. A full 75% of people living with HIV knew their HIV status in 2017, up from 66% in 2015—in three short years the number of people living with HIV who don’t know their status fell from a third to a quarter. Worldwide, the percentage of people living with HIV who are virally suppressed has increased significantly, from 38% in 2015 to 47% in 2017. But access is mixed. In some parts of the world, getting a viral load test is easy—it is fully integrated into a person’s treatment regime—but in other places it is close to impossible, with only one viral load machine for the entire country.

To reach the 90–90–90 targets, including the target of ensuring that 90% of people on treatment have a suppressed viral load, we have to redouble our efforts to reach the millions who are not aware of their HIV status and to reach the millions who are not virally suppressed.

To reach the millions who do not know their status, we need universal access to HIV testing services—HIV testing should be as widely available as pregnancy testing. To reach the millions who are not virally suppressed, we need viral load monitoring to be as available in Lilongwe as in London. HIV testing and viral load testing should be universal.

In the past few years, we have seen incredible innovations become available that are helping to revolutionize the AIDS response. HIV self-testing kits allow people to test for HIV in privacy, expanding testing rates among hard-to-reach populations. HIV self-testing is reaching more and more men, young people and key populations—gay men and other men who have sex with men, sex workers, transgender people, people who inject drugs, prisoners and other incarcerated people and migrants. And point-of-care viral load testing machines are bringing virological testing nearer to the people who need it.

But technology alone will not be enough to ensure that people can access the HIV testing services they need. Stigma, discrimination and abuses of human rights are still among the biggest barriers to the uptake of all HIV services, including testing. Stigma and discrimination must be confronted wherever it is experienced. Human rights, including one of the most fundamental, the right to health, need to be upheld if we are ever to reach our goal of ending AIDS.

HIV testing gives people the knowledge they need to make choices—choices on the right options for treatment and prevention. Knowledge really is power. The power of people to determine the right options to keep healthy. And the power to stay well and live long and productive lives. Let's ensure that everyone has that power.

Michel Sidibé

UNAIDS Executive Director

INTRODUCTION AND SUMMARY

The end of knowledge is power . . . lastly, the scope of all speculation is the performing of some action, or thing to be done.

Thomas Hobbes
De Corpore (1655)

Skill to do comes of doing; knowledge comes by eyes always open, and working hands; and there is no knowledge that is not power.

Ralph Waldo Emerson
"Old Age," an essay within the collection *Society and Solitude* (1870)

Knowledge is power. These words of wisdom have been passed down through the centuries. Initially this "power" likely referred to political power—the power to rule over others—but by the Age of Enlightenment, the power provided by knowledge was considered more personal. Knowledge gave individuals power over their environment and circumstances: the power to control their own destiny.

For people who may have been exposed to HIV, knowledge is critical to making informed decisions about their future. An HIV test is a serious event with potentially serious outcomes. But no matter the result, the test provides vital information. A negative result is an opportunity to take deliberate steps to prevent future acquisition through prevention methods tailored to that individual's risks. A positive test result—and a confirmatory diagnosis—is never welcome news, but for people living with HIV, it is a necessary first step towards a long and healthy life.

Initiation of antiretroviral therapy must follow as soon as possible. But treatment by itself is not sufficient. Durable viral suppression is needed to ensure both a normally functioning immune system and that HIV will not be transmitted to others. Viral load testing is required to confirm that antiretroviral therapy is successfully suppressing viral load.

The power of knowledge is displayed on the cover of this report. Mandisa Dukashe and her family live in Eastern Cape, South Africa. Mandisa, a nurse who specializes in quality control in health-care settings, is living with HIV. Knowing her HIV status and durably suppressing her viral load through treatment has helped ensure that her husband and two daughters are HIV-negative.

Figure 1. More than half of people living with HIV not virally suppressed
People living with HIV, by viral suppression status, global, 2017



More than half of people living with HIV have unsuppressed viral loads

Despite the critical roles that HIV testing and viral load testing play in the lives of people living with HIV, about one in four globally did not know their HIV status in 2017, and viral load testing coverage remained low in many parts of the world. Gaps across the HIV testing and treatment cascade leave more than half of all people living with HIV globally with unsuppressed viral loads (Figure 1), increasing the danger of HIV drug resistance and threatening efforts to meet the impact targets within the 2030 Agenda on Sustainable Development.

The latest available data from countries show that progress towards the 90–90–90 testing and treatment targets has been strongest in eastern and southern Africa, Latin America and high-income countries. Among countries where data were available, 24 countries had achieved or were on track to achieve the first 90, and 26 countries had fully achieved or were on track to fully achieve the second 90 (Table 1).¹ However, progress towards the end goal—viral suppression—is lower. At the end of 2017, just 12 reporting countries had fully achieved or were on track to fully achieve the third 90, which translated to 73% of people living with HIV having durably suppressed viral loads.

Progress varies by region. The Asia and the Pacific and the Caribbean regions will need to accelerate their testing and treatment programmes to get on track to reach the 90–90–90 targets by 2020. Knowledge of HIV status is relatively high in eastern Europe and central Asia, but treatment coverage and viral suppression are alarmingly low. Testing, treatment and viral suppression levels in Middle East and North Africa and western and central Africa are considerably off track.

¹ Achievement of the first 90 is defined as 90% of people living with HIV know their HIV status, and on track is defined as 85–89% at the end of 2017. Full achievement of the second 90 is defined as 81% of people living with HIV accessing treatment, and on track is defined as 75–80% at the end of 2017. Full achievement of the third 90 is defined as 73% of all people living with HIV have suppressed viral loads, and on track is defined as 65–72% at the end of 2017.

Progress within regions, income levels and epidemic settings also vary. In Asia and the Pacific, for example, Cambodia has nearly achieved the 90–90–90 targets, while progress has been slower Indonesia, Pakistan and Philippines. In eastern and southern Africa, low-income Rwanda has fully achieved the second 90, while treatment coverage and viral suppression are lower in upper-middle-income South Africa, despite achievement of the first 90. In western and central Africa, performance along the cascade in Burkina Faso, Burundi and Cabo Verde is much higher than the regional average.



Table 1. High testing and treatment coverage in eastern and southern Africa and high-income countries
Testing and treatment cascade, all ages, by country, 2017

	Knowledge of status among all people living with HIV (%)	Percentage of all people living with HIV who are on treatment	Percentage of all people living with HIV who are virally suppressed
ASIA AND THE PACIFIC	74	53	45
Afghanistan			
Australia		82	
Bangladesh	35	19	
Bhutan			
Brunei Darussalam			
Cambodia	88	87	83
China			
Democratic People's Republic of Korea			
Fiji			
India	79	56	
Indonesia	42	14	
Japan		82	
Lao People's Democratic Republic	75	47	45
Malaysia	83	45	42
Maldives			
Mongolia	32	28	
Myanmar		66	
Nepal	64	49	44
New Zealand		78	
Pakistan	15	8	8
Papua New Guinea		55	
Philippines	71	36	
Republic of Korea			
Singapore	91	77	72
Sri Lanka	68	37	34
Thailand	>95	72	62
Timor-Leste			
Viet Nam		50	43
CARIBBEAN	73	57	40
Bahamas		57	39
Barbados		49	
Belize		31	
Cuba	80	66	43
Dominican Republic	77	52	43
Guyana		64	
Haiti		64	
Jamaica	75	34	17
Suriname	65	51	43
Trinidad and Tobago		62	
EASTERN AND SOUTHERN AFRICA	81	66	52
Angola		26	
Botswana	86	84	81
Comoros	28	27	
Eritrea		62	
Eswatini	90	85	74
Ethiopia	73	71	32
Kenya		75	63
Lesotho	80	74	68
Madagascar	8	7	
Malawi	90	71	61
Mauritius			
Mozambique	59	54	
Namibia	90	84	74
Rwanda		83	
South Africa	90	61	47
South Sudan		13	
Uganda	81	72	56
United Republic of Tanzania		66	48
Zambia		75	
Zimbabwe	85	84	
EASTERN EUROPE AND CENTRAL ASIA	73	36	26
Albania	66	42	14
Armenia	66	45	38
Azerbaijan		46	22
Belarus	79	46	30
Bosnia and Herzegovina			
Georgia	48	39	35
Kazakhstan	79	43	24
Kyrgyzstan	75	39	27
Montenegro	84	59	54
Republic of Moldova	56	34	27
Russian Federation	81	36	27
Tajikistan	51	33	22
The former Yugoslav Republic of Macedonia	72	52	45
Turkmenistan			
Ukraine	56	40	23
Uzbekistan	41	29	
LATIN AMERICA	77	61	52
Argentina	75	66	
Bolivia (Plurinational State of)	75	36	23
Brazil	84	64	59
Chile	70	59	53
Colombia		54	
Costa Rica	66	54	
Ecuador	64	54	34
El Salvador	74	48	31
Guatemala	67	39	28
Honduras		52	45
Mexico	64	62	46
Nicaragua		48	21
Panama	70	53	21
Paraguay	68	39	22
Peru		67	
Uruguay	82	57	44
Venezuela (Bolivarian Republic of)			

Knowledge of status among all people living with HIV (%)

85% and above	
70–84%	
50–69%	
Less than 50%	
No data	

Percentage of all people living with HIV who are on treatment

75% and above	
55–74%	
30–54%	
Less than 30%	
No data	

Percentage of all people living with HIV who are virally suppressed

65% and above	
40–64%	
25–39%	
Less than 25%	
No data	

	Knowledge of status among all people living with HIV (%)	Percentage of all people living with HIV who are on treatment	Percentage of all people living with HIV who are virally suppressed
MIDDLE EAST AND NORTH AFRICA	50	29	22
Algeria	84	80	58
Bahrain	76	45	
Djibouti		27	
Egypt	51	24	
Iran (Islamic Republic of)	41	19	13
Jordan			
Kuwait	72	64	59
Lebanon		61	
Morocco	69	57	46
Oman			
Qatar	68	54	32
Saudi Arabia			
Somalia		28	
Sudan		15	
Syrian Arab Republic			
Tunisia		31	
United Arab Emirates			
Yemen			
WESTERN AND CENTRAL AFRICA	48	40	29
Benin		55	42
Burkina Faso	88	65	49
Burundi	80	77	
Cameroon	71	49	
Cabo Verde		75	
Central African Republic	53	32	
Chad		45	
Congo	32	29	
Côte d'Ivoire	54	46	35
Democratic Republic of the Congo	59	55	
Equatorial Guinea		38	
Gabon	77	59	
Gambia		32	
Ghana		40	
Guinea		35	
Guinea-Bissau		30	
Liberia		29	
Mali		32	13
Mauritania	33	33	22
Niger	55	52	
Nigeria	38	33	
Senegal	71	54	41
Sierra Leone	47	39	24
Togo	66	57	

	Knowledge of status among all people living with HIV (%)	Percentage of all people living with HIV who are on treatment	Percentage of all people living with HIV who are virally suppressed
WESTERN AND CENTRAL EUROPE AND NORTH AMERICA	85	76	65
Austria	88	84	62
Belgium			
Bulgaria	87	43	25
Canada			
Croatia			
Cyprus		65	
Czechia	>95	68	64
Denmark	88	83	83
Estonia		72	
Finland			
France		81	
Germany		74	
Greece	>95	67	
Hungary		59	55
Iceland			
Ireland	87	73	69
Israel			
Italy	87	86	66
Latvia			
Lithuania	94	29	22
Luxembourg	86	78	70
Malta			38
Netherlands	87	80	76
Norway		90	
Poland			
Portugal	91	80	71
Romania	92	76	52
Serbia	91	64	
Slovakia	87	75	
Slovenia	73	58	58
Spain		82	
Sweden			
Switzerland			
Turkey			
United Kingdom			
United States of America			
GLOBAL	75	59	47

Note: Data are for 2017, except as follows: 2016 - Austria, Czechia, Denmark, Germany, Italy, Luxembourg, Netherlands, Portugal, Serbia, Slovenia; 2015 - Croatia and Hungary. Estimates are for citizens of the country only for Kuwait and Saudi Arabia.

Source: UNAIDS special analysis, 2018; for more details, please see Annex on methods in *Miles to go: closing gaps, breaking barriers, righting injustices*. Geneva: UNAIDS; 2017 (http://www.unaids.org/sites/default/files/media_asset/miles-to-go_en.pdf).

Addressing the large viral suppression gap in western and central Africa

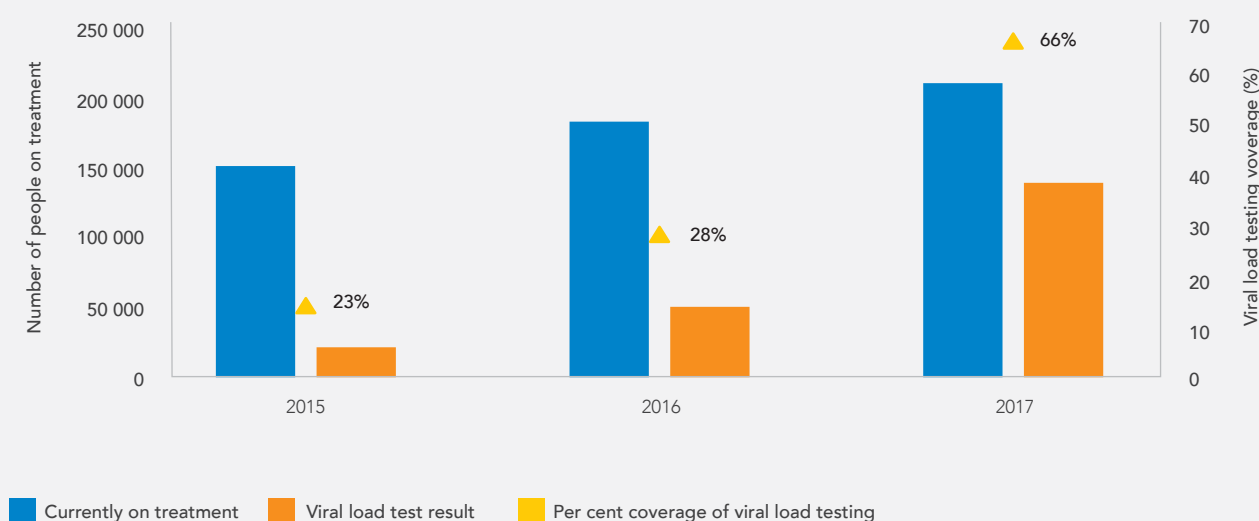
There are huge gaps along the testing and treatment cascade in western and central Africa. At the end of 2017, less than half (48%) of people living with HIV knew their HIV status in the region, just two in five (40%) were accessing antiretroviral therapy, and less than one third (29%) were virally suppressed. Although the region is home to just 6% of the global population, it accounted for one third (34%) of the estimated 9.4 million undiagnosed people living with HIV and nearly one quarter (22%) of the 19.4 million people living with HIV who were not virally suppressed in 2017.

Insufficient domestic funding, weak health systems, user fees for health care, humanitarian situations and high levels of stigma and discrimination have undermined efforts to scale up HIV testing and treatment in the region. A growing number of countries in the region have signed on to a catch-up plan, a compact between countries and the international community to address bottlenecks to scale-up, accelerate national responses and reach a trajectory to achieve the 90–90–90 targets by 2020 (1).

Shared responsibility between national governments and the international community can quickly close important gaps, as seen in Côte d'Ivoire, where the United States President's Emergency Plan for AIDS Relief (PEPFAR) is supporting a national scale-up plan for viral load testing. In just three years, as the number of people on treatment doubled, 10 additional laboratories began viral load testing, and viral load testing coverage increased from 14% in 2015 to 66% in 2017, with coverage projected to reach 75% by the end of 2018 (Figure 2) (2).

Figure 2. Scaling up viral load testing in Côte d'Ivoire

Number of people on treatment and viral load testing coverage, Côte d'Ivoire, 2015–2017



Source: Adje-Toure C, CDC-Côte d'Ivoire. Challenges and access to viral load testing in Africa: example of Cote d'Ivoire. Presentation. (https://www.iasociety.org/Web/WebContent/File/EduFundCoteIvoire_Christiane_Adje-Toure.pdf; accessed 14 November 2018).

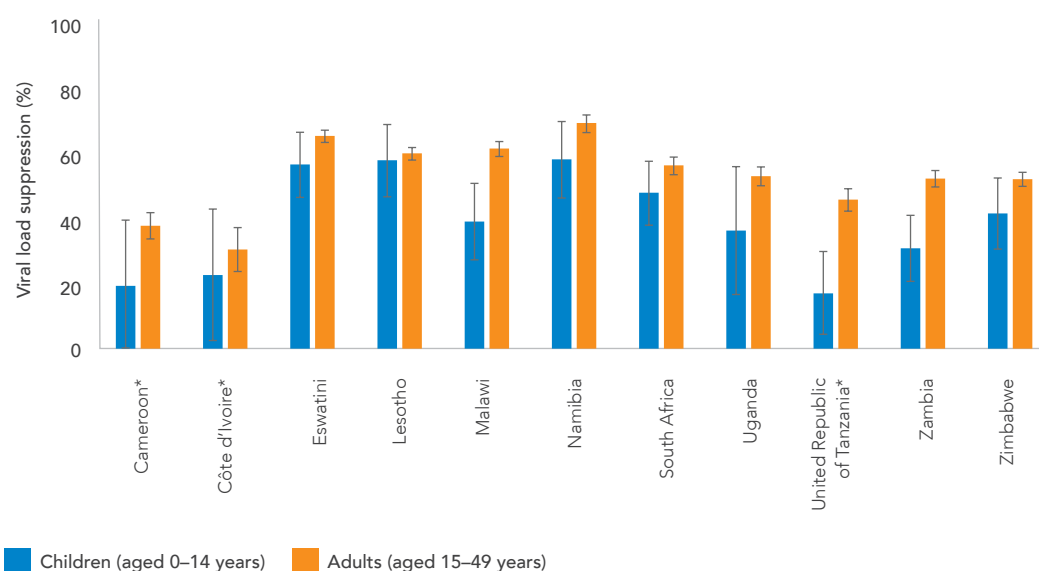
Common patterns of inequity

There are common patterns of inequity within countries. Knowledge of HIV status, treatment coverage and viral suppression rates are consistently lower among children, young people and men. Knowledge of HIV status among key populations at higher risk of HIV infection varies widely country by country, and the majority of evidence points to weaker treatment adherence and lower viral suppression among female sex workers, people who inject drugs, transgender women and men, prisoners and gay men and other men who have sex with men. Young women and girls face gender-related barriers to services, including gender-based violence and denial of sexual and reproductive health rights. Particular barriers also exist for migrants, refugees, people living with disabilities and other vulnerable groups.

For example, children living with HIV face numerous challenges that widen the gaps along the HIV testing and treatment cascade. Multiple visits to a health facility are required to determine an infant's HIV status through virological testing. Furthermore, many infants are unable to start treatment before the period of peak mortality at two or three months of age; without treatment, up to 50% of children born with HIV will die before their second birthday (3–5). The development of optimal paediatric drug formulations also lags behind adult drug development. These challenges often translate to lower rates of viral suppression, as can be seen in data from national surveys conducted in 11 countries in sub-Saharan Africa (Figure 3).

Figure 3. Lower viral suppression among children

Percentage of people living with HIV with suppressed viral loads, children and adults, 11 countries, 2015–2017



Source: Cameroon Population-based HIV Impact Assessment (CAMPHIA), 2017; Côte d'Ivoire Population-based HIV Impact Assessment (CIPHIA), 2017–2018; The Swaziland HIV Incidence Measurement Survey 2 (SHIMS2), 2016–2017; Lesotho Population-based HIV Impact Assessment (LePHIA), 2016–2017; Malawi Population-based HIV Impact Assessment (MPHIA), 2015–2016; Namibia Population-based HIV Impact Assessment (NAMPHIA), 2017; South African National HIV Prevalence, Incidence, Behaviour and Communication Survey, 2017; Uganda Population-based HIV Impact Assessment (UPHIA), 2016–2017; Tanzania HIV Impact Survey (THIS), 2016–2017; Zambia Population-based HIV Impact Assessment (ZAMPHIA), 2015–2016; The Zimbabwe Population-based HIV Impact Assessment (ZIMPHIA), 2015–2016.

* Estimates for children (aged 0–14 years) are based on a small number of unweighted cases (<50) and should be interpreted with caution.

Disempowerment driven by stigma and discrimination and violence

HIV-related stigma and discrimination disempowers people living with HIV and people at risk of HIV infection. Studies across continents and cultures show that taboos and misunderstandings about HIV persist, discouraging people from seeking the knowledge and services they need. In Zambia, fear of negative reactions from family members can lead to caregivers avoiding testing a child who may have been exposed to HIV (6). In the United States of America, anticipated rejection following seroconversion is a significant barrier to testing for gay men and other men who have sex with men and transgender women (7). For many men at risk of HIV infection in South Africa, HIV testing and linkage to care are fraught with fear and trauma stemming from the previous loss of parents and loved ones to AIDS-related illnesses before treatment was widely available (8). Women living with HIV in Eswatini may drop out of treatment to avoid the dishonour that could result from their HIV status being disclosed (9).

Dozens of countries have passed legislation that explicitly prohibits discrimination on the basis of HIV status. However, legal barriers remain on the books in many places, including laws that criminalize nondisclosure, exposure or transmission of HIV. Breaches of confidentiality in health-care settings still occur with alarming frequency. When news of one's HIV-positive status result may lead to rejection, violence or criminal prosecution, the consequences of taking an HIV test or regularly visiting a health facility for medicine refills or viral load testing can appear worse than the consequences of avoiding these services.

Violence is a very real threat for women living with HIV and members of key populations. Women living with HIV who experience intimate partner violence are significantly less likely to adhere to treatment, and they therefore have worse clinical outcomes and lower viral suppression (10, 11). Violence—and the threat of violence—is also linked to legal contexts in which members of key populations may be arrested or otherwise targeted for drug use, sex work, same-sex sexual acts or changing their gender. Criminalization of these behaviours can be a powerful deterrent to seeking HIV testing and treatment.



Too far, too expensive, too long, too complicated

Where services are difficult to access—such as where people must travel long distances to a clinic or where clinic hours are not suited to individuals or groups—the uptake of these services tends to decrease. Food insecurity, costs associated with HIV and viral load testing (including for the tests themselves), other health-care costs, transport costs, lost income and opportunity costs contribute to later treatment initiation, lower treatment adherence and higher rates of AIDS-related mortality (12–16). Long wait times at clinics or having to return for test results increase the percentage of people who seek testing but don't receive a result.

Delays between an HIV diagnosis and treatment initiation further slow efforts to increase treatment coverage. Adherence to treatment can also be a challenge when support mechanisms are not in place, especially for young people and men. Insufficient integration of tuberculosis and HIV services leaves nearly half of people living with HIV and tuberculosis unaware of their coinfection and lacking the treatment they need (17). As a result, tuberculosis remains the leading preventable cause of death among people living with HIV. Suboptimal retention in HIV treatment and care, drug stock-outs and inadequate support for treatment adherence favour the emergence and transmission of HIV drug resistance (18).

Expanding knowledge through active, diversified and rights-based approaches

Safeguarding the right to health of people at risk of HIV and those living with HIV requires the delivery of HIV services that are available, accessible, acceptable, of good quality and delivered according to established human rights principles. Within this human rights-based approach, innovations in HIV testing and viral load testing are contributing to progress towards the 90–90–90 targets.

A human rights-based approach to HIV calls for the following:

- Availability, accessibility, acceptability and good quality of services.
- Nondiscrimination and equality.
- Privacy and confidentiality.
- Respect for personal dignity and autonomy.
- Meaningful participation and accountability (21).

Point-of-care virological testing technologies are providing faster results for both infant diagnosis and viral load monitoring for people on treatment. Point-of-care assays for early infant diagnosis are being rolled out in 15 African countries, shortening the time it takes to return infant test results to caregivers from weeks to hours. This allows treatment to be more consistently initiated before the immune systems of infected infants weaken. In Mozambique, 89.7% of infants living with HIV who were diagnosed with point-of-care assays initiated antiretroviral therapy within 60 days of sample collection, compared to 12.8% of children who received standard early infant diagnosis (20).

Community-based testing using rapid test kits can overcome many of the logistical, structural and social barriers to HIV testing. It can reach people who live far away from a health facility, provide services at times that suit people at high risk of HIV infection, and mitigate the stigma and discrimination that can accompany HIV testing and a positive diagnosis. The PopART (HPTN 071) cluster-randomized trial achieved the first and second 90s within urban communities in South Africa and Zambia in just three years by offering a combination of services that included home-based voluntary HIV testing and counselling (21).

HIV testing delivered through peers is increasing the reach, uptake and acceptability of testing. Engaging adolescents and key populations living with HIV as outreach workers is proving particularly successful for diagnosing and initiating treatment among HIV-positive peers. Similarly, testing the sexual partners, children and other household and family members of people living with HIV—an approach known as index testing—has been shown to be a particularly effective way to reach people who are less likely to seek voluntary counselling and testing (such as men and children). Partner notification and network tracing are two forms of index testing that have increased the yield of HIV testing efforts. The potential for intimate partner violence or social harm following partner notification or network tracing remains a concern, but thus far, reports of adverse events have been low.

The increasing availability of HIV self-test kits is boosting several HIV testing modalities and improving HIV testing among young people, men and key populations. Concerns about linkages to confirmatory diagnosis and treatment initiation after a reactive self-test are being addressed through peer-assisted self-testing in a wide range of settings, including megacities in Asia and rural communities of southern Africa.

The economic case for optimized HIV testing

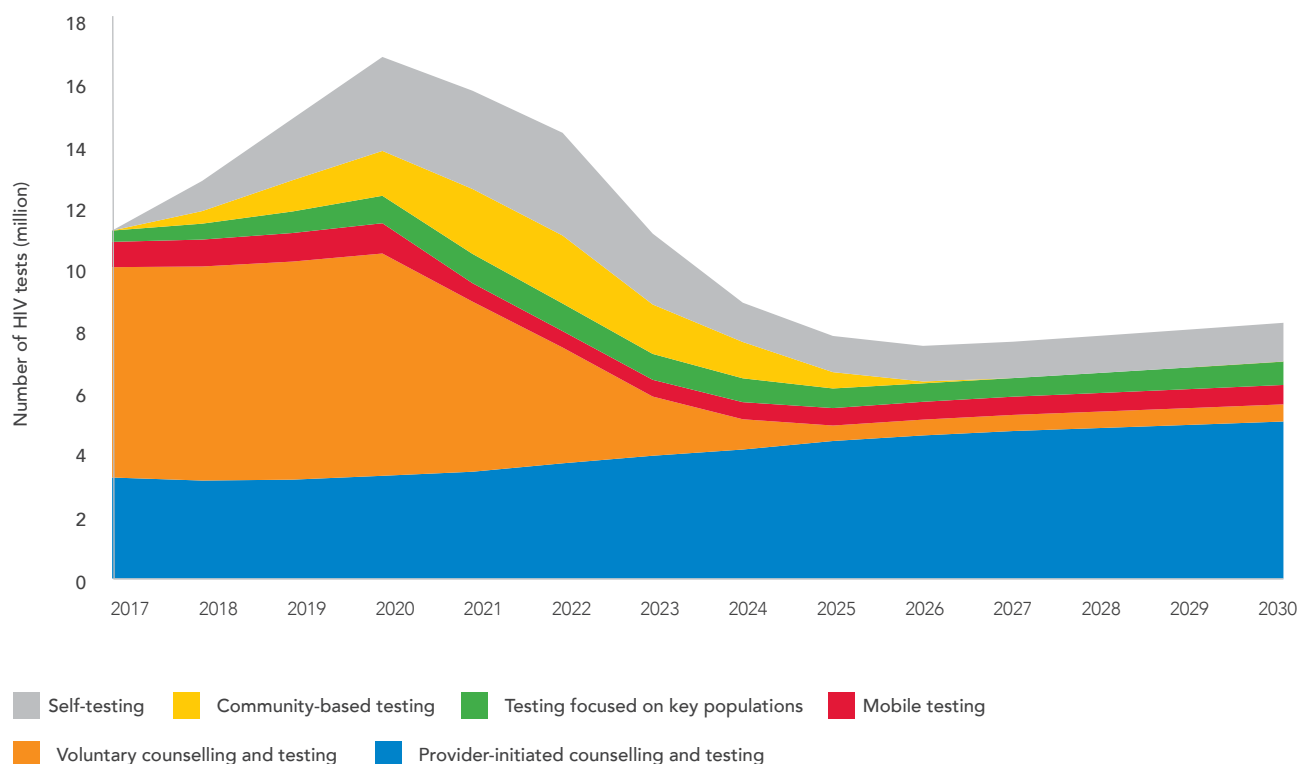
A special analysis by Avenir Health and UNAIDS provides a compelling economic case for countries to optimize their HIV testing programmes to reach the first 90 by 2020 by using a mixture of modalities that make an HIV test more accessible and acceptable to the people most at risk of HIV acquisition. The analysis focused on a hypothetical country with a generalized epidemic, where 80% of people living with HIV were aware of their status at the end of 2017. In the optimized strategy, community-based testing and self-testing are introduced and rapidly scaled up, while voluntary counselling and testing is scaled down. Compared to a scenario where the testing strategies and budget are kept constant from 2017, front-loading resources for the expansion of HIV self-testing and community-based testing (Figure 4) could avert almost 200 000 additional deaths between 2018 and 2030. The optimized strategy also greatly reduces the number of tests needed to maintain the first 90 after 2020, which translates to significant cost savings and higher economic return for the national HIV testing programme. Using the full-income approach, which values changes in both income and better health, each US dollar invested in optimized testing and linkage to antiretroviral therapy would bring an economic return of US\$ 3.40 during the period 2018–2030.

Expanding access to viral load testing

Viral load testing among people on treatment is increasing. Among the 63 countries that reported data to UNAIDS in both 2016 and 2017, about one quarter reported increases in viral load testing coverage. In some high-prevalence countries, the pace of scale-up has been extraordinary. In Uganda, for example, the number of districts with 90% or greater coverage of viral load testing increased from 29 to 70 in a single year, and the number of districts with less than 80% coverage decreased from 53 to 22 (Figure 5).

Figure 4. An optimized testing scenario

Projected number of HIV tests in an optimized HIV testing strategy, by testing modality, hypothetical country with a generalized epidemic, 2017–2030



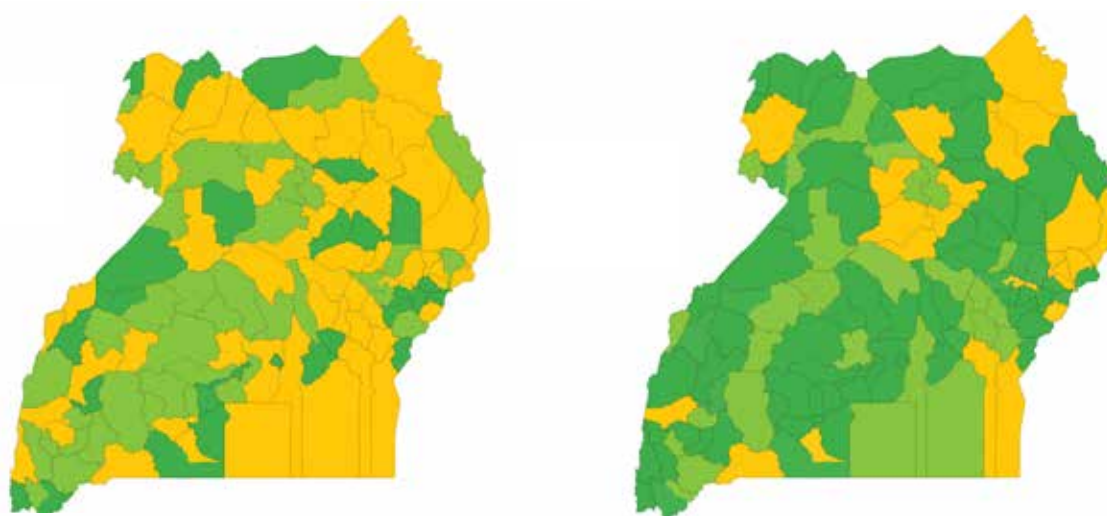
Source: Avenir Health and UNAIDS, special analysis, 2018.

Figure 5. Remarkable viral load testing scale-up

Coverage of viral load testing, by district, Uganda, July 2016–June 2018

July 2016 to June 2017

July 2017 to June 2018



Source: Uganda Viral Load Dashboard, Central Public Health Laboratories, Ministry of Health.

Multidisease approaches

AIDS does not exist in isolation. The nature of HIV—both the way it is transmitted and how it attacks the immune system—makes the response to HIV a holistic effort to reduce risk from multiple health and social issues, and to address multiple medical conditions faced by people living with HIV. Multidisease approaches also are a key component of universal health coverage, which aims to ensure that all people have access to the health services they need without the risk of financial hardship when paying for them (22).

Developments in molecular technologies mean that it is increasingly possible to diagnose different diseases rapidly using single platforms. These offer technical and financial efficiencies for national health systems, while expanding access to care and saving lives (23, 24). These “one-stop shop” multidisease services can encourage routine HIV testing as just another part of a health check-up, and they can also increase the efficiency of health care provision by reducing the need for the multiplication of staff, infrastructure and other resources. Multidisease services can also overcome barriers to HIV service uptake, such as stigma and discrimination, because visiting an integrated-service facility may make it harder for others to guess an individual’s HIV status (25, 26).

Improving knowledge of HIV status and viral suppression for individuals and society

Global efforts to set and meet bold targets like 90–90–90 reflect the societal importance of a robust HIV response. Achieving knowledge of status and viral suppression among the maximum percentage of people living with HIV will minimize AIDS-related morbidity and mortality, and it will contribute to the prevention of new HIV infections. In concert with efforts to achieve all of the commitments made by the United Nations General Assembly at the 2016 High-Level Meeting on Ending AIDS, this can put the end of the AIDS epidemic within reach.

This report takes a deep dive into the HIV testing and treatment data that countries report to UNAIDS, as well as data and experiences from large-scale programmes, small-scale projects and cutting-edge research across dozens of countries and a variety of epidemic settings. These data reveal gaps and barriers, as well as innovative ways to overcome barriers and fill coverage gaps. This body of information also shows that the HIV response is first and foremost about people. Behind every gap in knowledge of HIV status or viral suppression gap among people living with HIV are millions of people being left behind—individuals who are not being reached by services delivered using status-quo methods.

A diversity of approaches is needed to reach the diversity of people in need.

Leading by example

In 2017, the President of France, Emmanuel Macron, led by example by taking an HIV test. Mr Macron and the First Lady of France, Brigitte Macron, visited a hospital in Saint Denis in northern Paris that caters to people in vulnerable situations, including migrants. In France, one in five people living with HIV do not know their HIV status. The majority of new HIV infections in the country occur among gay men and other men who have sex with men.

"We have not won the battle against AIDS. We need to protect ourselves, get tested, get treated and accept those in society who have HIV."

Emmanuel Macron, President of France



Crédit : Présidence de la République



PART I.

Gaps and barriers

- Gaps across the HIV testing and treatment cascade
- Barriers faced by infants living with HIV
- When services are available but unacceptable
- When services are available but inaccessible

AT A GLANCE

GAPS IN KNOWLEDGE OF HIV STATUS AND VIRAL SUPPRESSION

The largest gap in the HIV testing and treatment cascade is HIV testing, with 25% of people living with HIV globally unaware of their HIV status. Another 16% were aware of their HIV status but not on treatment, and an estimated 11% were on treatment but not virally suppressed.

The viral load testing gap

Viral load testing coverage remains low in many parts of the world. One quarter of reporting countries indicated that less than half of people on treatment received an annual viral load test.

Low viral suppression among key populations

Available data from small-scale studies suggest that viral suppression is far below the target needed to slow transmission among these populations.

Deadly delays in infant diagnosis

The time between blood sample collection from infants exposed to HIV and the return of results to caregivers often stretch for months, past the time period of peak mortality for children living with HIV.

Stigma and discrimination

Stigma and discrimination create barriers to HIV testing and treatment, particularly for adolescents and young people, men, key populations and vulnerable groups, such as migrants, refugees and people living with disabilities.

Barriers faced by women living with HIV

Structural factors that affect women's overall access to health and resources combine with the common taboos and misconceptions that surround HIV, creating multiple barriers to viral suppression among women living with HIV.

Confidentiality and disclosure

Breaches of confidentiality in health-care settings still occur with alarming frequency, undermining trust in health-care providers and decreasing the willingness of people to access HIV-related health care.

Too difficult and too expensive

When people must travel long distances to a clinic, transport is expensive or unavailable, or clinic hours are not suited to individuals or groups, the uptake of these services decreases. Limited household resources and the inability to pay user fees rank among the top factors blocking access to health-care services among people living with HIV.

Insufficient HIV–tuberculosis service integration

Tuberculosis is the leading preventable cause of death among people living with HIV. Despite the clear advantages, integration of tuberculosis and HIV services is far from universal. Just 44 of 116 reporting countries have fully integrated HIV and tuberculosis treatment.

A growing danger of drug resistance

Suboptimal retention in treatment and care services, drug stock-outs and inadequate treatment support can increase HIV drug resistance. Adherence support and monitoring of viral load suppression is key to maintaining the robustness of newer generations of antiretroviral medications, such as integrase inhibitors.

GAPS ACROSS THE HIV TESTING AND TREATMENT CASCADE

Knowledge of HIV status is the largest gap

Nearly two decades of activism and ambition has driven the expansion of antiretroviral therapy for people living with HIV. In recent years, the 90–90–90 targets have focused efforts across a cascade of testing and treatment services, putting additional emphasis on the importance of knowing one's HIV status and, if living with HIV, initiating treatment as soon as possible and adhering to treatment. The goal is sustained viral suppression, which not only protects people living with HIV from AIDS-related illness, it also prevents transmission of the virus to others.



The 90–90–90 testing and treatment targets

By 2020:

- 90% of people living with HIV know their HIV status.
- 90% of people who know their HIV-positive status are accessing treatment.
- 90% of people on treatment have suppressed viral loads.

At the end of 2017, an estimated 75% [55–92%] of people living with HIV globally knew their HIV status; among them, 79% [59–>95%] were accessing antiretroviral therapy, and 81% [60–>95%] of people accessing treatment had suppressed viral loads. Despite this laudable progress, less than half of all people living with HIV (47% [35–59%]) had suppressed viral loads at the end of 2017.

Among the 53% of people living with HIV who were not virally suppressed, the largest gap in the HIV testing and treatment cascade is HIV testing. One quarter of people living with HIV globally were unaware of their HIV status, another 16% were aware of their HIV status but not on treatment, and an estimated 11% were on treatment but not virally suppressed (Figure 6).

Three gaps on the path to viral suppression

Figure 6. Knowledge of status, treatment and viral suppression gaps, global, 2017

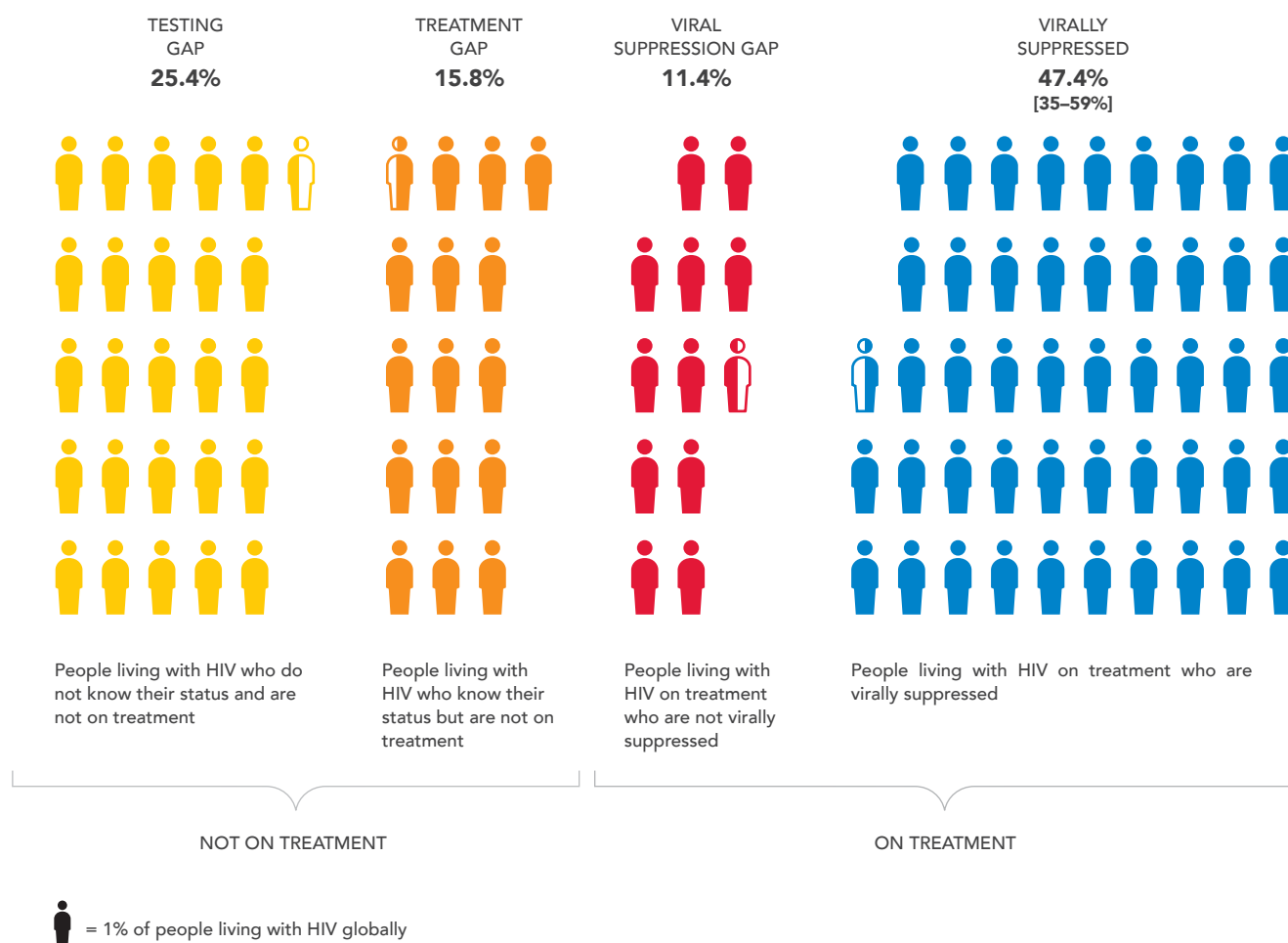
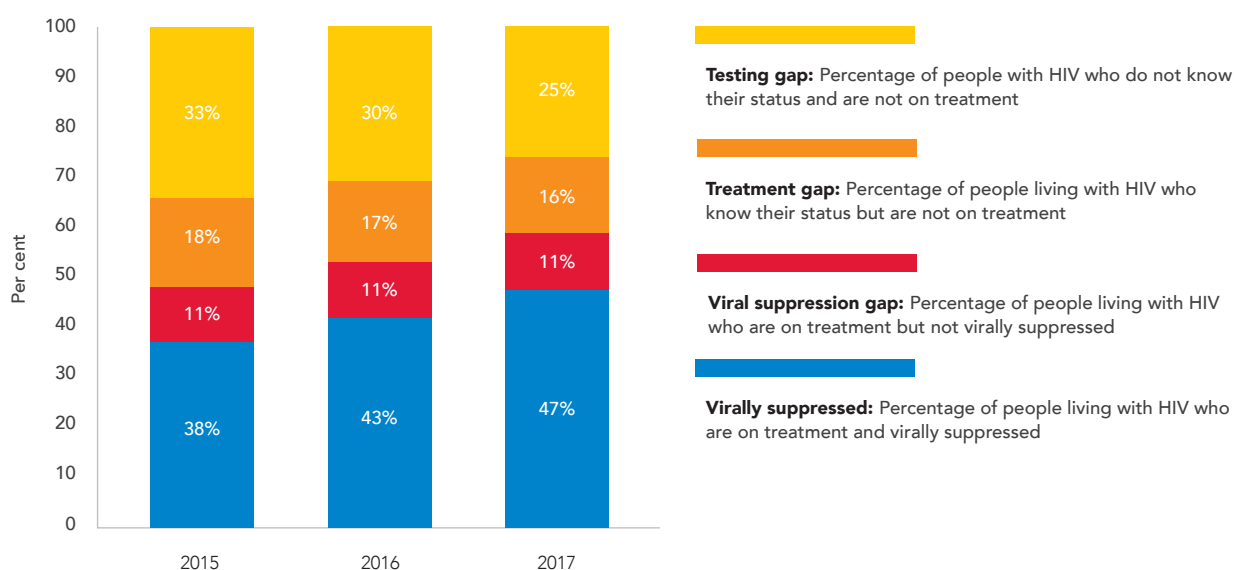


Figure 7. Knowledge of status, treatment and viral suppression gaps, global, 2015–2017



Source: UNAIDS special analysis, 2018.



The growing prominence of the viral suppression gap

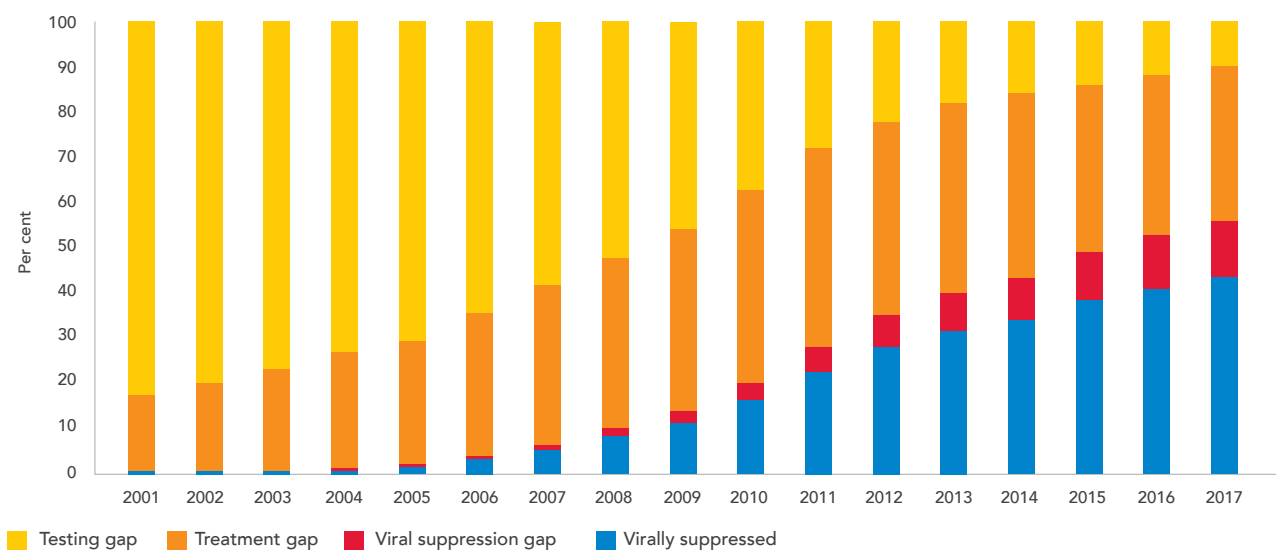
Although the gap in knowledge of HIV status is the largest, the viral suppression gap is growing more prominent. Knowledge of HIV status and treatment coverage have increased more rapidly than viral suppression. As a result the percentage of people of people living with HIV who are not virally suppressed has remained static at 11% in recent years, and the viral suppression gap's share of the total gap has grown from 18% in 2015 to 21% in 2017 (Figure 7).

In some countries, the viral suppression gap is growing in size. South Africa's Thembisa model, developed by the University of Cape Town and used by South Africa's Department of Health to produce national estimates, shows that the percentage of people living with HIV who are on treatment but not virally suppressed in South Africa has risen from an estimated 0.1% in 2004 to an estimated 12.4% in 2017. Over the same time period, the percentage of people living with HIV who do not know their HIV status has shrunk from an estimated 76.6% to an estimated 10.0% (Figure 8) (1).

The UNAIDS 90–90–90 estimates for 2015–2017 in eastern and southern Africa show the same pattern: the viral suppression gap increased from 10% in 2015 to 14% in 2017. In most other regions, the gap has remained stable, and in Latin America—where testing and treatment programmes have achieved high coverage for many years—the percentage of people living with HIV who are on treatment but not virally suppressed is slowly decreasing (Figure 9).

Figure 8. The growing viral suppression gap in South Africa

Knowledge of status, treatment and viral suppression gaps, South Africa, 2001–2017

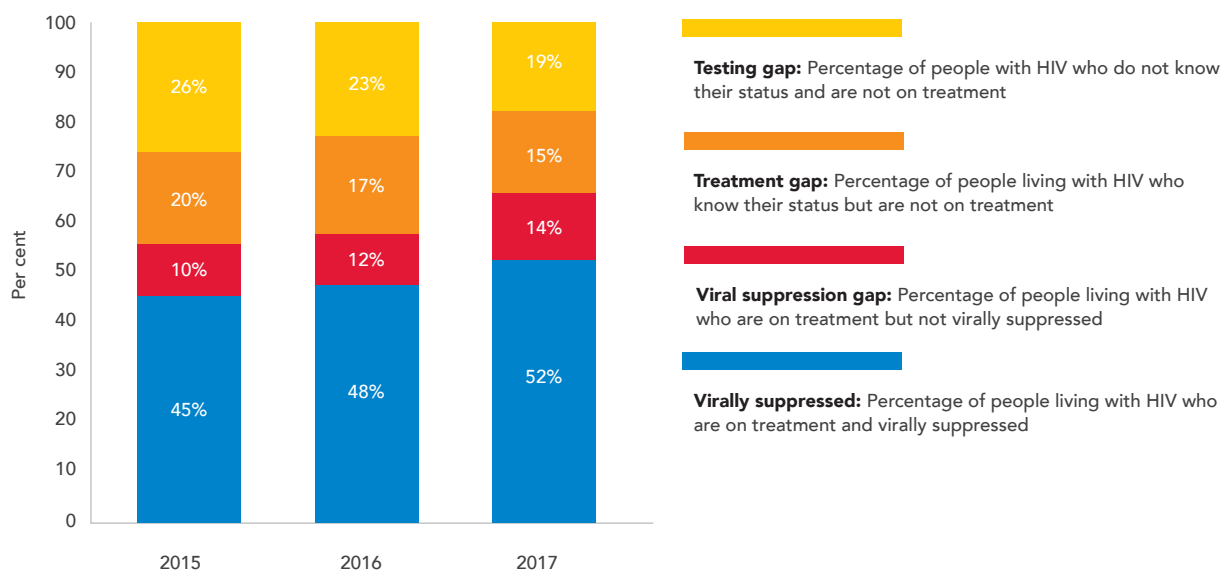


Source: Estimates from the Department of Health, South Africa, Thembisa model, 2018.

Figure 9. Trends vary among regions

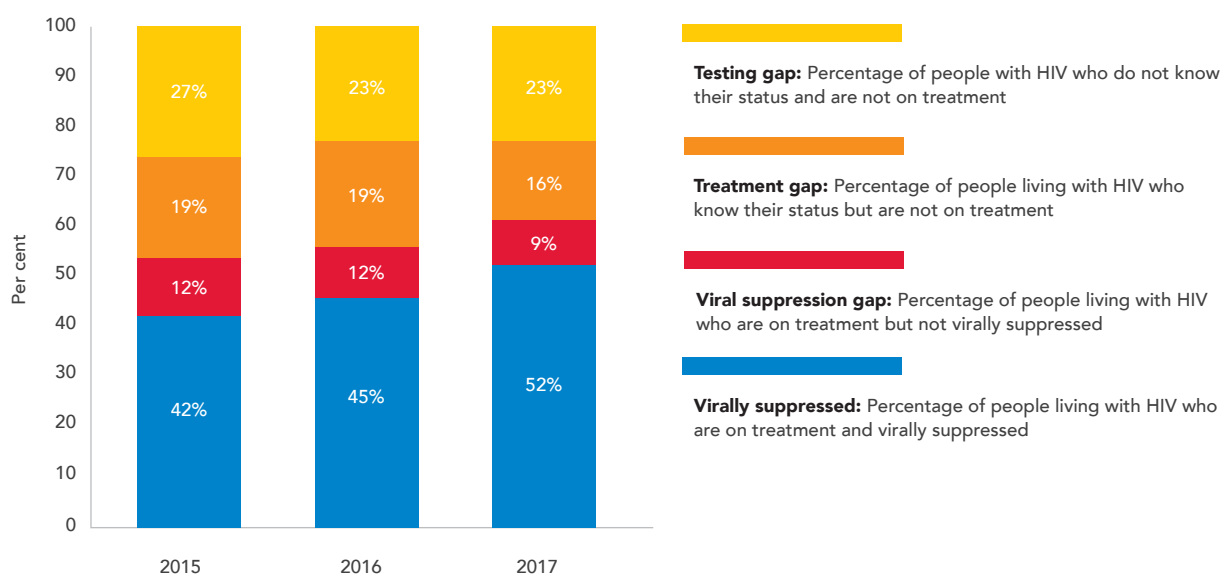
Knowledge of status, treatment and viral suppression gaps, two regions, 2015–2017

EASTERN AND SOUTHERN AFRICA



Source: UNAIDS special analysis, 2018.

LATIN AMERICA



Source: UNAIDS special analysis, 2018.

The viral load testing gap

Monitoring viral load is the recommended approach for checking that treatment is working and determining whether viral suppression is achieved and sustained (2). Viral load monitoring is also used for diagnosing and confirming treatment failure.

Viral load testing is already the standard of care for people living with HIV in most high-income countries. However, viral load testing coverage remains low in many parts of the world. Among the 79 countries that reported 2017 data to UNAIDS, one quarter (21) indicated that less than half of people on treatment received an annual viral load test. Another 15% of these countries (12) reported that between half and three quarters received an annual viral load test (Table 2). Greater political will and funding are needed to scale up capacity in low-income and middle-income countries (3).

Table 2. Low viral load testing coverage in many countries

Viral load testing coverage among people on treatment, countries with available data, 2017

75% and above				50–74%	Less than 50%	
Algeria	El Salvador	Lithuania	Russian Federation	Azerbaijan	Afghanistan	Malaysia
Armenia	Eswatini	Maldives	Saudi Arabia	Cambodia	Albania	Mauritania
Bahamas	Georgia	Mexico	Singapore	Côte d'Ivoire	Benin	Myanmar
Barbados	Honduras	Mongolia	Sri Lanka	Cuba	Burkina Faso	Nigeria
Brazil	Jamaica	Montenegro	Tajikistan	Ethiopia	Burundi	Pakistan
Bulgaria	Kazakhstan	Morocco	Thailand	Greece	Cameroon	Philippines
Chile	Kenya	Oman	The former Yugoslav Republic of Macedonia	Namibia	Gabon	Senegal
Comoros	Kuwait	Panama	Tunisia	Nepal	Ghana	South Sudan
Croatia	Kyrgyzstan	Paraguay	Uganda	Nicaragua	Iran (Islamic Republic of)	Togo
Czechia	Lao People's Democratic Republic	Peru	Uruguay	Suriname	Jordan	Viet Nam
Dominican Republic	Lebanon	Qatar		Ukraine	Madagascar	
Ecuador	Lesotho	Republic of Moldova		Uzbekistan		

Source: UNAIDS 2018 estimates; Global AIDS Monitoring, 2018.

HIV testing and viral suppression among key populations living with HIV



The HIV epidemic disproportionately continues to impact key populations at substantially increased risk for HIV infection. A UNAIDS analysis of available data shows that transgender women and men, sex workers, people in prisons and other closed settings, people who inject drugs and gay men and other men who have sex with men have relative risks of HIV acquisition ranging from five to 28 times greater than the rest of the population.

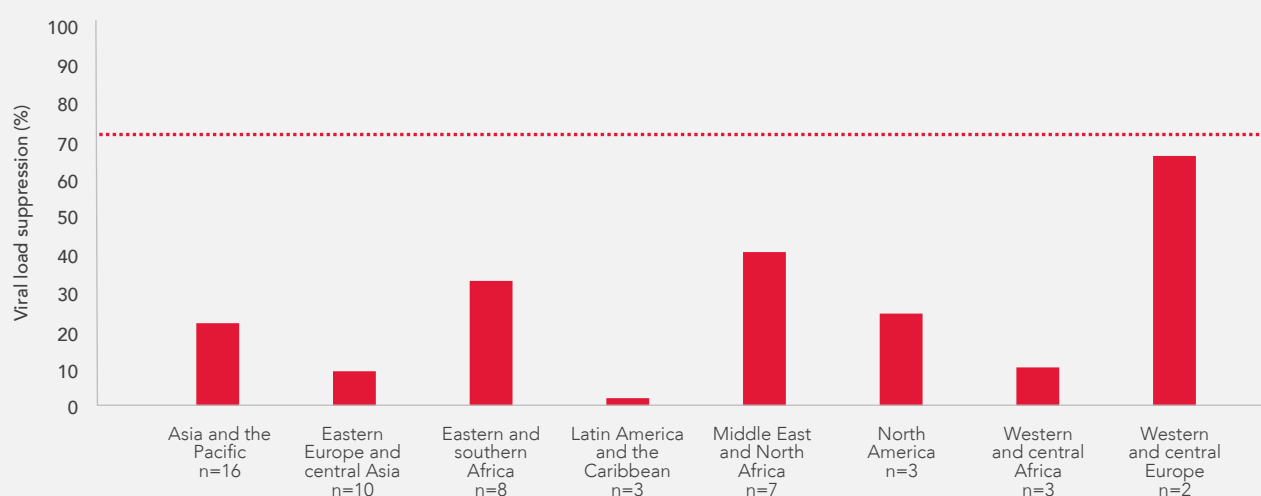
Available data suggest that 47% of new HIV infections globally in 2017 were among key populations and their sexual partners. The 90–90–90 targets cannot be achieved unless the testing and treatment needs of key populations are met. Epidemiological and programme data must be collected to guide efforts to reach these targets.

HIV testing coverage among key populations is often measured through special surveys that use respondent-driven sampling. UNAIDS analysis of data from these surveys shows that awareness of HIV status among key populations across various districts, cities and countries around the world ranges from the low teens to above 90%.^{*} These surveys also suggest that the percentage of key populations who report taking an HIV test and receiving the results within the last 12 months is between 50% and 75%. This testing rate has been stable for several years.

Viral suppression data for specific key populations are not yet widely available, and the available data are contradictory. High levels of adherence to treatment among female sex workers have been reported in Burkina Faso, Mozambique, South Africa and Zimbabwe, while other data from South Africa also show high viral suppression rates (84%) among gay men and other men who have sex with men living with HIV who received treatment (4–7). The majority of evidence points to weaker treatment adherence among key populations (8). Discrimination and harassment against gay men and other men who have sex with men undermine their retention in HIV care (9). Drug use has been linked to low treatment adherence in Canada and Estonia (10, 11). On aggregate, available data from small-scale studies suggest that viral suppression is far below the target needed to slow transmission among these populations (Figure 10).

Figure 10. Low viral suppression among key populations

Median percentage of key populations[†] living with HIV who are virally suppressed, by region, 2013–2017



[†] Gay men and other men who have sex with men, sex workers, people who inject drugs and transgender women and men.

Note: The figure reflects a range of sources over a range of years, including early data on viral load suppression among key populations. These data are not representative of viral load suppression among key populations at national level.

Source: See the chapter reference list for detailed sourcing.

^{*} Respondent-driven sampling relies on members of a hard-to-find population referring additional people within the population to the data collectors of the study. This snowball sample is then adjusted using a mathematical model that weights the sample to compensate for the fact that the sample was collected in a nonrandom way.

BARRIERS FACED BY INFANTS LIVING WITH HIV

Antiretroviral therapy for the prevention of mother-to-child transmission has greatly reduced new HIV infections among children. Globally, 1.4 million [880 000–2 100 000] new child infections have been averted since 2010, and in 2017, there were just 180 000 [110 000–260 000] transmissions of HIV from mother to child.

Early infant diagnosis: Global AIDS monitoring guidelines define early infant diagnosis as testing infants of women living with HIV within two months of birth. Because of the danger of HIV transmission through breastfeeding, HIV-exposed children should be retested three months after breastfeeding ends or at 18 months of age, whichever is later.

However, efforts to diagnose children living with HIV and initiate treatment face numerous challenges. Due to the presence of maternal antibodies in infants and young children, rapid diagnostic testing is ineffective up until 18 months of age. Virological testing using nucleic acid testing technologies can be used effectively, but diagnosis can still be difficult. Infants infected at or around delivery may not have a detectable level of virus for several days or even weeks. In addition, the ability of nucleic acid testing to detect virus in the blood may be affected by antiretroviral medication taken by the mother or infant for postnatal prophylaxis, or by the mother during breastfeeding, resulting in false-negative results.

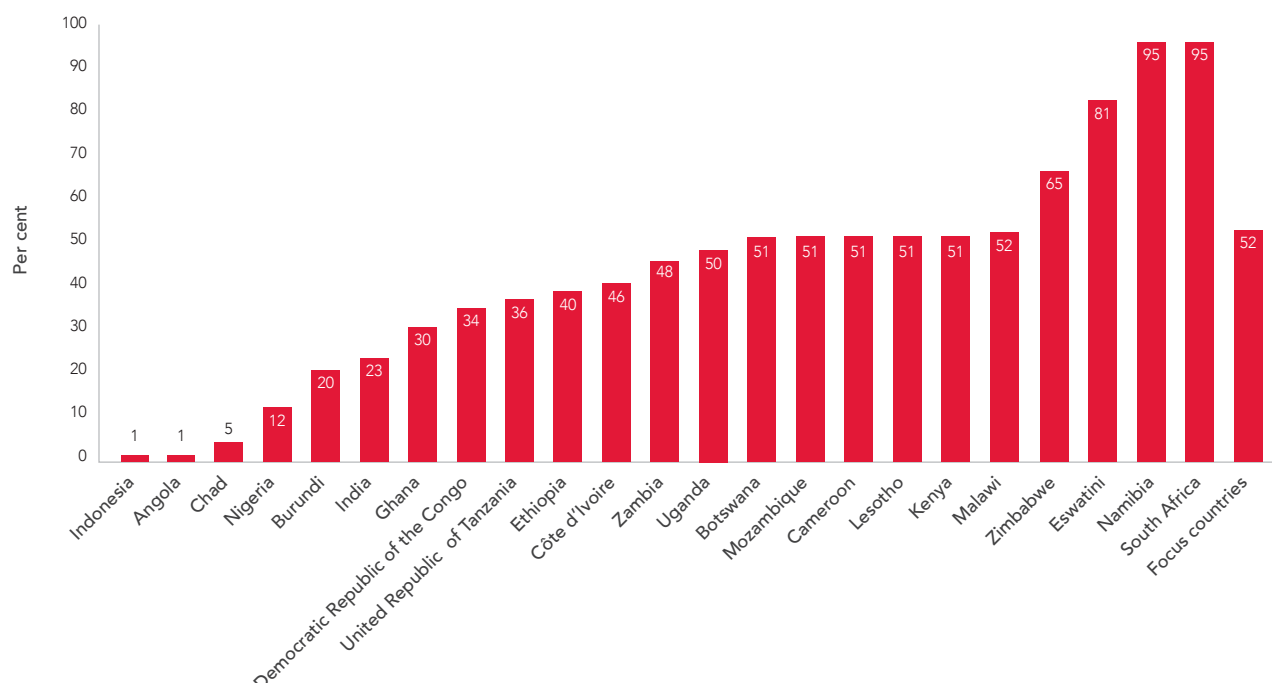
At the same time, HIV disease progression among perinatally infected infants is much faster than among adults. Without treatment, up to 50% of children born with HIV will die before their second birthday, with peak mortality at two or three months of age (12–14). The earliest possible initiation on treatment is therefore essential for saving the lives of HIV-infected infants.

To manage these difficulties, infants with known or uncertain HIV exposure should be tested for HIV using a virological test at the first postnatal visit (usually four to six weeks) or other child health visit; those who test positive should be started on treatment without delay, while a confirmatory test is undertaken (15). Because of the danger of HIV transmission through breastfeeding, infants who test negative at this time should be retested throughout the entire exposure period, which ends three months after breastfeeding ends or at 18 months of age, whichever is later.

Insufficient availability of virological testing and the numerous visits to a health facility and time required to receive a result negatively affect coverage. In 23 focus countries—which accounted for 87% of the world's births to women living with HIV in 2017—just 52% of newborns exposed to HIV received an HIV test within eight weeks of birth (Figure 11).

Figure 11. Nearly half of HIV-exposed infants are not tested

Percentage of children born to women living with HIV who were tested for HIV within eight weeks of birth, 23 focus countries, 2017



Source: 2018 Global AIDS Monitoring.

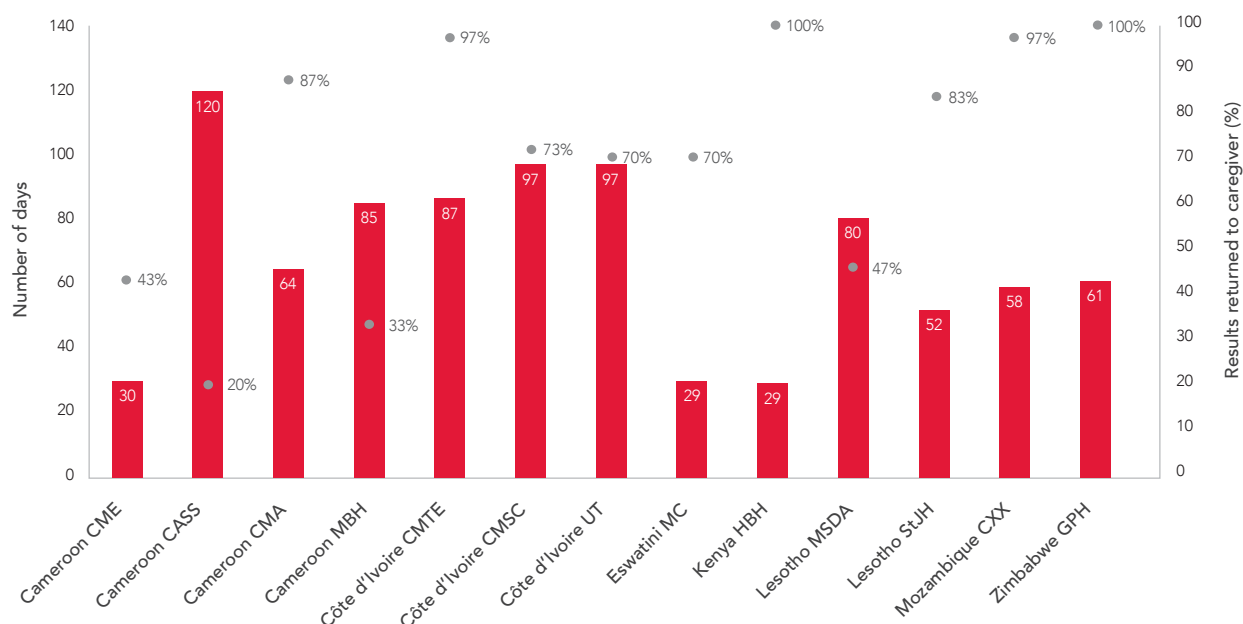
The long and winding road to infant diagnosis

Virological testing technologies often are only available in centralized reference laboratories. Considerable infrastructure and training are required, as are transport networks for the delivery of specimens to the laboratory. The process of transporting samples to central laboratories from decentralized health facilities, batching blood samples for testing and returning the results to testing sites often creates long delays between the time when the blood sample is collected and when the result is received (16, 17).

Unfortunately, these constraints are not limited to rural and remote areas. Even where health facilities are in urban areas and close to laboratories, turnaround times can stretch to three to four months—past the time period of peak mortality—and the proportion of results returned can be as low as one in five (Figure 12) (18). The result is a delay in initiating treatment—or a complete failure to initiate it—and high levels of infant mortality (19).

Figure 12. Slow return of test results threatens the lives of infants living with HIV

Early infant diagnosis, turnaround time from sample collection to return of results and percentage of results returned to caregivers, clinics in urban settings, seven countries, 2016–2017



Source: Baseline data from EGPAF-supported sites in nine countries (n = 30 infants/site; sampled in 2016–2017).

Paediatric treatment

Linking children to treatment following an HIV diagnosis and achieving sustained viral suppression is also challenging. HIV treatment services are usually designed for adults and tend to lack consideration of the specific needs of younger people (children and adolescents) (20). In terms of actual antiretroviral medicines, there is a pressing need for age-appropriate paediatric formulations: development of optimal paediatric formulations still lags eight to 10 years behind that of adults, mainly due to the lack of market incentives and technical complexities in manufacturing (21). High rates of HIV drug resistance have been observed in infants, children and adolescents.¹ Children and adolescents also are reliant on the ability of their parents or caregivers to shoulder the burden of seeking out treatment and providing daily care and support—an ability that may be compromised by material and psychological difficulties (22).

¹ See, for example: Muri L, Gamell A, Ntamatungiro AJ, Glass TR, Luwanda LB, Battegay M et al. Development of HIV drug resistance and therapeutic failure in children and adolescents in rural Tanzania: an emerging public health concern. *AIDS*.2017;31(1):61–70.



WHEN SERVICES ARE AVAILABLE BUT UNACCEPTABLE

In order to achieve high coverage and realize the right to health, HIV services must be available, accessible, acceptable and of good quality.

HIV testing is available in all 174 countries that reported data to UNAIDS in 2017. However, service availability does not necessarily translate into service uptake and improved knowledge of HIV status among people living with HIV. Manifestations of stigma and discrimination, including discriminatory legal frameworks, create barriers to testing and other HIV services, particularly for adolescents and young people, men, key populations and vulnerable groups (such as migrants, refugees and people living with disabilities). Mandatory and coerced testing are breaches of individual rights that contribute to climates of fear and punishment. Structural factors—such as the cost and accessibility of services—further discourage people from getting tested. Poor quality counselling (or a complete absence of it) weakens links between testing and treatment.

These obstacles lie across the path of those seeking to learn their HIV status, and they erode efforts to achieve viral suppression among people living with HIV.



The five Cs of testing

Consent: HIV testing is a choice, and an individual's decision to take an HIV test must always be voluntary. People being offered testing for HIV must give informed consent and have the right to refuse testing without consequences.

Confidentiality: Testing services must be confidential. Test results and the content of discussions between the person tested and the testing provider, counsellor and/or other health-care workers cannot be disclosed to anyone else without the consent of the person tested.

Counselling: Appropriate and high-quality brief pretest information and post-test counselling needs to be tailored to the person, and the test results must be available.

Correct results: HIV test results delivered to individuals must be accurate and communicated to the person tested, unless that person subsequently decides that they do not wish to receive the results.

Connections: Linkages to HIV prevention, treatment, and care and support services should be supported through concrete and well-resourced patient referral, support and/or tracking systems (23).

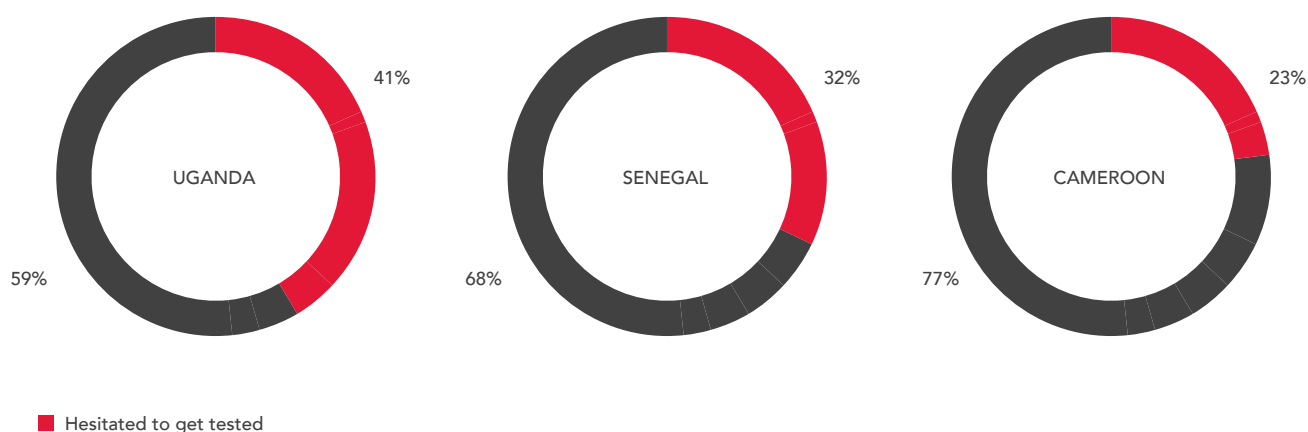
HIV-related stigma and discrimination

HIV-related stigma and discrimination—irrational or fear-driven negative attitudes, behaviours and judgments towards people living with HIV and those perceived to be living with HIV—create both real (enacted) and feared (anticipated) consequences, including violence, marginalization and abandonment. Fear of one's HIV status being disclosed, either inadvertently or on purpose, can make the consequences of taking an HIV test or accessing treatment appear higher than the consequences of avoiding these services.

Higher anticipated HIV stigma has been associated with a lower probability of adults having had an HIV test and a higher likelihood of delaying regular HIV testing (24, 25). Surveys of people living with HIV conducted in three African countries in 2017 show that many hesitated to take a test out fear of stigma and discrimination (Figure 13) (26). A review of 10 studies from low-income and middle-income countries found that people living with HIV who perceived high HIV-related stigma were 2.4 times more likely to present late for HIV care (27).

Figure 13. Avoiding testing out of fear of HIV-related stigma

Percentage of people living with HIV who reported hesitating to get tested for HIV because of fears of how other people would respond if they tested positive, 2017



Source: People living with HIV Stigma Index surveys, 2017.

In Zambia, a study found that fears of negative reactions from family members were the most common reason that caregivers gave for not testing a child, despite suspecting that the child may have been infected (28). Additional fears included being labelled HIV-positive, pre-existing conflicts between the couple or within the family, and observed stigmatization of seropositive children in one's own neighbourhood. The analysis also showed that some women and children were denied access to testing by individuals within the household, leading to delayed diagnosis and treatment. This was linked to social norms that assign male household heads the power to decide the use of health-care services by their wife and children, jeopardizing the power of women to claim their rights to health care, especially in a conflict-affected relationship. Men fearing loss of status due to being associated with HIV—and women worrying about being blamed for bringing HIV into the household—exacerbated this pattern (28).

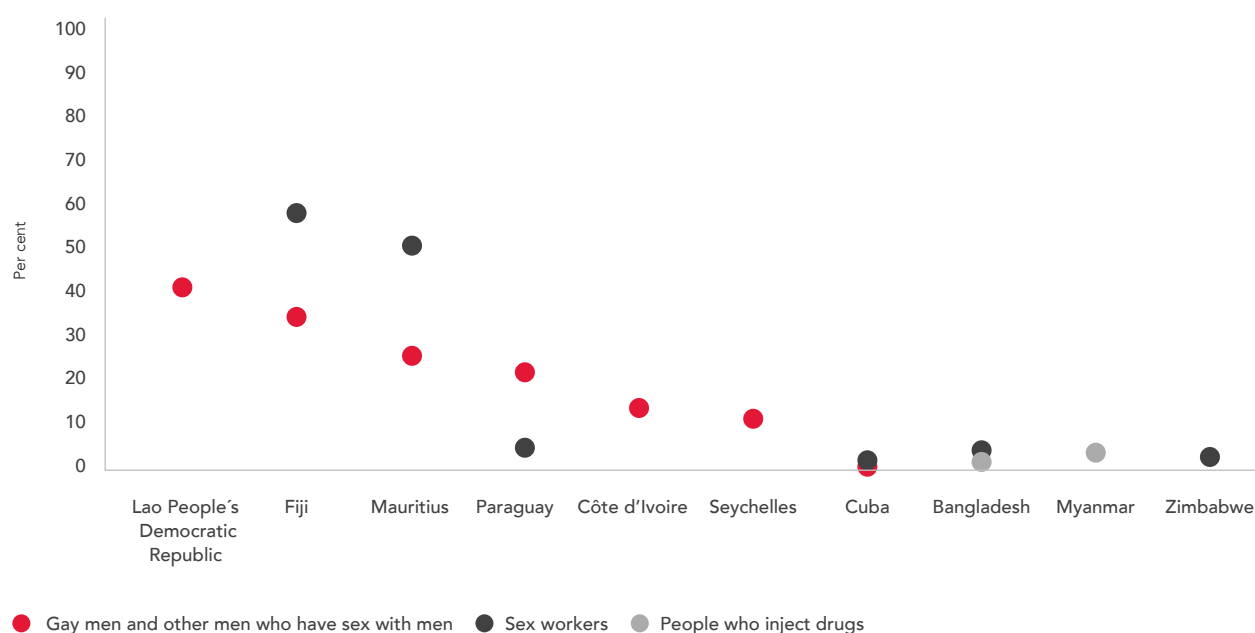
In Australia, almost three quarters (74%) of people living with HIV who participated in a 2016 online survey reported experiencing stigma related to their HIV status within the 12 months prior to the survey, while 6% of Australian health worker respondents to a survey conducted in the same year reported that they may have discriminated against clients living with HIV in the past 12 months (29). Ethiopian women who had stigmatizing attitudes towards people living with HIV were less likely to be tested for HIV during pregnancy (30). A survey of pregnant women living with HIV in three districts of Uganda found that fear of disclosing HIV-positive status to male partners was a key barrier to initiating lifelong antiretroviral therapy (31).

Stigma and discrimination faced by key and vulnerable populations

HIV-related stigma and the stigma and discrimination faced by people who inject drugs, sex workers, transgender women and men, prisoners and gay men and other men who have sex with men can be mutually reinforcing and hard to disentangle, particularly where HIV infection is ascribed to certain populations or behaviours. Stigma and discrimination by health-care workers is particularly damaging to service provision: integrated biological and behavioural surveys show that key populations in many countries avoid HIV testing due to stigma and discrimination (Figure 14). Contexts in which health-care workers are legally obliged to report to the authorities when individuals in their care are suspected of engaging in criminalized activities (e.g., drug use, sex work or same-sex sexual activity) exacerbate this situation.

Figure 14. Many within key populations avoid testing

Percentage of key populations who reported having avoided HIV testing in the past 12 months due to stigma and discrimination, countries with available data, most recent data, 2013–2017



Source: Integrated biological and behavioural surveys, 2013–2017.

Other studies show the following:

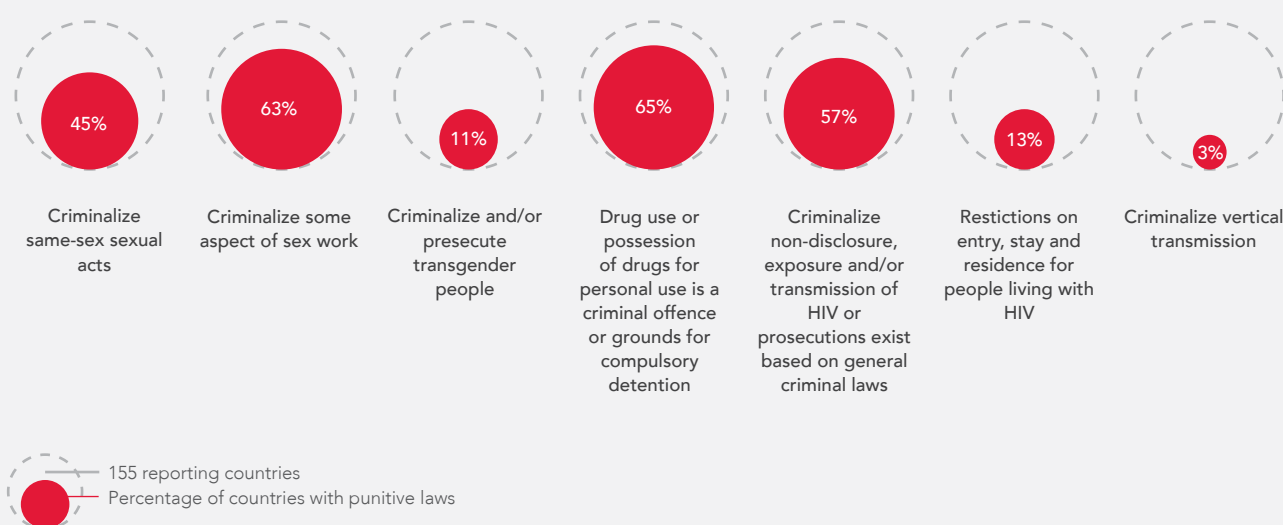
- In Nigeria, gay men and other men who have sex with men who had previously experienced stigma related to their sexuality were found to have experienced psychological stress that decreased their willingness to be tested for HIV (32).
- People who inject drugs in Thailand were almost seven times as likely to avoid HIV testing if they had been previously refused treatment or services by health-care workers (33).
- Anticipated rejection following seroconversion was identified as a significant barrier to testing among gay men and other men who have with men and transgender women in the United States (25).

Society's vulnerable populations also face challenges. For example, migrants have specific legal and administrative impediments to accessing HIV testing and other services (particularly where they are undocumented and, as a result, are not entitled to health care), and they face cultural and linguistic barriers, racism and xenophobia that serve to restrict access. They also have a higher frequency of delayed HIV diagnosis than people among the general population (34). People with disabilities also struggle to access HIV testing and treatment. Barriers include lack of disability-friendly educational materials and sign interpreters, stigmatizing treatment by providers and other patients, lack of training on the provision of tailored services to persons with disabilities and physically inaccessible infrastructure (35).

Legal barriers

In the United Nations General Assembly's 2016 Political Declaration on Ending AIDS, it was agreed to review and reform legislation that may create barriers or reinforce stigma and discrimination. However, country reports to UNAIDS show that legal barriers remain in many countries.

Figure 15. Number of countries with legislation that hampers the AIDS response, global, 2018



Source: See the July 2018 UNAIDS publication, *Miles to go*, for detailed sourcing.

Violence and the threat of violence

Violence faced by people living with HIV continues to be alarmingly prevalent in much of the world. Violence not only directly harms people living with HIV; the threat of violence also discourages them from undertaking any actions that may reveal their status, and fear of violence if their status is known can lead to delays in being tested (36).

Unequal power relations, limited access to education, lack of economic autonomy and suppressed decision-making power in the home and wider society expose women living with HIV to stigma, discrimination and intimate partner violence. Women living with HIV may feel forced to disclose their status to avoid prosecution under laws that criminalize exposure or transmission, placing them at increased risk of abuse and violence at the hands of partners, families and communities. Threats by abusive partners to take legal action under criminalization laws (such as those on HIV transmission or sex work) become a part of the cycle of power and control in abusive relationships. Violence, gender norms and inequality can also make women disproportionately vulnerable to prosecution (37). In addition, women living with HIV who experience intimate partner violence are significantly less likely to adhere to treatment, and they therefore have worse clinical outcomes and lower viral suppression (38, 39).

Violence—and the threat of violence—is also linked to legal contexts in which members of key populations (and others) legitimately fear that they will be arrested or otherwise targeted on the basis of engagement in criminalized behaviour, including when they attempt to access health-care services. Where anti-sex work laws exist, the common knowledge that sex workers are unlikely to report violence—or be taken seriously when they do—creates a culture of impunity for law enforcement and civilians alike, even if no arrest has taken place. Harassment and violence during policing is commonplace, especially when the threat of arrest is imminent (40).

Confidentiality and disclosure

There is growing international consensus that all patients have a fundamental right to privacy, including the confidentiality of their medical information (41). A lack of confidentiality not only undermines trust in health-care providers, decreasing the willingness of people to access HIV-related health care, but it also increases the fear of stigma and discrimination based on HIV status or presumed membership in a stigmatized key population.

Breaches of confidentiality in health-care settings still occur with alarming frequency: available survey data from seven countries show that one in five people living with HIV reported that a health-care worker had disclosed their HIV status without consent (42). Even when health-care workers use strict discretion, there is a risk of inadvertent disclosure, and HIV-specific clinics, contact tracing and testing drives can inadvertently reveal a person's HIV status. Just being seen at an HIV testing centre may be perceived to reflect HIV-related risk behaviour or an HIV-positive status (36). In Ghana, for example, a study found that the mere presence of a person at an HIV counselling centre or clinic is enough for the person to be labelled as (or suspected to be) an HIV patient (43). In Jamaica, worries about confidentiality among transgender women and gay men and other men who have sex with men included public disclosure of status by health-care providers and the use of separate rooms in health-care centres that everyone knew were for HIV testing (44).



GENDER AND STIGMA BARRIERS FACED BY WOMEN LIVING WITH HIV

A multistage review of conducted the ATHENA Network, AIDS Vaccine Advocacy Coalition and Salamander Trust, in collaboration with the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women), revealed how structural factors that affect women's overall access to health and resources—such as poverty, economic security and decision-making power—interact with the common taboos and misconceptions that surround HIV (45).

Gender inequality and HIV-related stigma and discrimination create multiple barriers to viral suppression among women living with HIV. Frequently cited barriers in the review included:

- Gender roles and responsibilities, including women having to ask permission from husbands or other family members to seek services.
- Violence, including violence in the home, in the community and in health facilities.
- Violations of rights to privacy, confidentiality and bodily integrity in health-care services.
- Caregiving responsibilities, such as missing health-care appointments due to unavailable or unaffordable childcare.
- Fear and experiences of stigma and discrimination, which contribute to nondisclosure of status, lower adherence, depression, low self-esteem and self-worth, and other mental health problems.
- Treatment side effects, including changes in body shape that do not adhere to gender norms and expectations for women's bodies and sexuality.
- Livelihood challenges, including food security, nutrition and housing (45).

Many of these themes emerged from an ethnographic study in Eswatini of women in long-term, committed relationships, most of whom had been diagnosed with HIV when they were pregnant. The study found that women living with HIV in Eswatini face particular challenges in initiating and adhering to treatment due to economic dependence on spouses and significant social vulnerability (46). Most of these women prioritized honour in marriage and the performance of being a good wife over seeking treatment. Spousal negotiation shaped nearly all spheres of life for these women, including decisions related to health care, and they also usually needed to consult with a wider circle of people (made up of their husband and kin from both sides of the family) before seeking health care. Decisions regarding which therapy to pursue were often made on a woman's behalf.

Treatment could be delayed or interrupted due to fear of HIV-related stigma directed at them, their household or their kin. Women were reluctant to disclose their HIV status, even though they may have to do so in order to explain clinic visits. Outward signs of antiretroviral therapy, such as the presence of medicines in the house, were viewed as disruptive to marital and family relations, potentially bringing

dishonour to them and their families. The researchers found that these women rarely opposed starting treatment or dropped out of care voluntarily. This led them to conclude that many women who were considered to be lost to follow-up were in fact actively navigating various social and economic challenges in an effort to initiate and maintain treatment (46).



Credit: AfriPics.com / Alamy Stock Photo

Consent laws

Laws that require individuals to have the consent of another person to access health-care services can constrain them from seeking such services. In many countries, people under the age of 18 must obtain parental consent in order to access sexual and reproductive health services, HIV testing and treatment. This requirement not only makes it impossible for young people to access services confidentially, but it also may make it impossible for them to access services at all. Parents may withhold consent (or support) out of fear of HIV stigma and other negative consequences of diagnosis, both for their child and for themselves (where identification of the child's status reveals that of the parent); they also may desire to protect their child (47). Consent might also be withheld due to parental incompetence, incorrect knowledge or unavailability (as in the case of children out of parental care). According to data provided to UNAIDS on age of consent laws, 45 countries require parental consent for a child under 18 to access HIV testing, 37 countries require parental consent for HIV treatment and 33 countries require parental consent to access sexual and reproductive health services (48). Four countries require spousal consent for women to access sexual and reproductive health services, and one country requires spousal consent for women to access HIV testing (49).

The World Health Organization (WHO) and UNAIDS do not support mandatory or compulsory testing of individuals on public health grounds. HIV testing, no matter how it is delivered, must always respect personal choice and adhere to ethical and human rights principles (23).

Coercive and mandatory testing

There is no public health benefit to coercive or mandatory testing (23). Studies have shown that undergoing HIV testing in settings perceived as harsh and coercive—such as prison or as mandated treatment—can impede acceptance of an HIV diagnosis, and that a lack of confidentiality within health-care settings and the use of coercive methods by health-care workers erode trust in treatment and care services and make retention in care more difficult (50, 51). Where such mandatory practices are in place, those who are targeted may avoid health care entirely. However, according to UNAIDS reporting, at least 62 countries continue to enforce mandatory testing for certain populations (such as pregnant women, prisoners or military personnel) or in certain situations (before marriage or in order to obtain a visa) (52).

Members of key populations may be particularly vulnerable to mandatory and coercive testing practices, particularly in contexts where there is criminalization of the behaviours or even identities of members of key populations. Sex workers, for example, may be subject to mandatory testing after arrest or in order to be able to work—even though a positive result may mean that they can no longer work. Innovations in testing that are designed to be more user-friendly and rights-friendly may be co-opted by those who seek to force others to take an HIV test. During a consultation on self-testing among sex workers in Australia, for instance, it was pointed out that introducing self-tests into a testing environment that is already coercive may make it easier to coerce sex workers to undergo an HIV test (53).

The potential and pitfalls of biometric data

The use of biomedical identifiers (such as fingerprints, voices, faces or irises) has improved disease responses, including responses to outbreaks of Ebola and multidrug-resistant tuberculosis (54, 55). They are particularly useful in low-income and middle-income countries, where public registration systems are weaker and nonregistration can be a barrier to government services or provisions, including health care (56).

In the context of the HIV response, however, where people living with HIV fear disclosure of their HIV status and the behaviours of people at risk of HIV are often criminalized, the use of biomedical identifiers comes with significant potential for violating privacy rights and exposing people to arrest or other sanctions. Security forces and the criminal justice system may use biometric data to find criminalized individuals and communities, as in China in 2017, when the police targeted sex workers through biometric identification (57). Fear of disclosure or arrest through the collection of biometric data may undermine trust in the health system, bias surveillance results and reduce service utilization.

In an effort to balance these advantages and dangers, a group of experts has published a typology of jurisdictions where biometric data collection should and should not be used (Table 3) (58).

Table 3. Appropriateness of using biometrics in HIV surveillance of key populations by type of jurisdiction

Group 1*: Jurisdictions in which a given population is criminalized either by statute or in practice

Appropriateness of biometrics: use of biometrics cannot be justified. Alternatives should be used.

Group 2*: Jurisdictions in which a given population faces high levels of social stigma and marginalization

Appropriateness of biometrics: use of biometric identifiers cannot be justified. Alternatives should be used.

Group 3: Jurisdictions in which a given population is not criminalized but has no explicit protections, and where stigma against a given population is relatively low

Appropriateness of biometrics: use of biometrics can be considered, with safeguards in place. Where no legal protections for the key population exist, these safeguards must include strong and explicit prohibitions on the disclosure of data, including liability and criminal penalties for such disclosure. Strong justification is needed for why these data are necessary to merit the risk. Alternatives should be carefully considered.

Group 4: Jurisdictions in which a given population is overtly protected by laws and policies prohibiting discrimination, and in which stigma against a given population is relatively low

Appropriateness of biometrics: use of biometrics can be considered, with safeguards in place, which must include strong and explicit prohibitions on the disclosure of data, including liability and criminal penalties for such disclosure.

*Groups 1 and 2 can overlap.

Source: Kavanagh M, Baral S, Milanga M, Sugarman J. Biometrics and public health surveillance in criminalised and key populations: policy, ethics, and human rights considerations. *Lancet HIV*. 7 October 2018. [http://dx.doi.org/10.1016/S2352-3018\(18\)30243-1](http://dx.doi.org/10.1016/S2352-3018(18)30243-1).

Similar concerns have been raised around phylogenetic studies, which track the genetic mutations of HIV and reveal patterns of HIV transmission. Phylogenetic HIV information has been used to prosecute people for transmitting HIV in several countries. These data can also reveal behaviours that are often criminalized or stigmatized, such as drug use or same-sex sexual behaviour, and there have been instances of breaches in protections of phylogenetic data that enable the identification of individuals (59).





WHEN SERVICES ARE AVAILABLE BUT INACCESSIBLE

Too difficult and too expensive

Where services are difficult to access—such as where people must travel long distances to a clinic, transport is expensive or unavailable, or clinic hours are not suited to individuals or groups—the uptake of these services will decrease. A study in China found an inverse relationship between geographic distance and ever being tested for HIV among its respondents (of whom only 25.2% had ever been tested, with none reporting self-testing) (60). A review of recent literature on testing among gay men and other men who have sex with men identified having to pay for services and past negative experiences associated with testing and service provision as barriers to access (61).

Both HIV diagnosis and viral load tests can be expensive. Nearly one in five countries that reported testing policy information to UNAIDS in 2017 did not have a policy specifying that HIV testing is provided for free (52). Where the costs of testing are borne wholly or partly by people at higher risk of infection or people living with HIV, those at lower income levels may not be able to afford them. Even when the test itself is free, affordability must also be measured in terms of lost income and opportunity costs when people visit health-care services (62).

For people living with HIV, limited household resources and the inability to pay user fees rank among the top factors limiting access to health-care services, including treatment (63). In particular, food insecurity and cost of transport and other health care-related expenses contribute to later treatment initiation, lower treatment adherence and higher rates of AIDS-related mortality (64–66).

Low risk perception

Perceptions of risk of HIV acquisition, whether accurate or not, are a key determinant of HIV testing (67). Considerable evidence shows that those who believe themselves to be at low risk of contracting HIV are less likely to be tested. For example, among a representative sample of the British population, 83.2% of gay men and other men who have sex with men did not perceive themselves to be at risk, and 84.8% had not tested for HIV within the past year (68). In Germany, a larger proportion of nontested gay men and other men who have sex with men perceived their general risk for HIV in the last 12 months to be low or very low (69). Lack of access to quality comprehensive sexuality education limits the amount of young people who have correct knowledge on HIV and the main modes of transmission, meaning that even where services exist, young people may not know about or take advantage of them. In Lilongwe, Malawi, a study found that most adolescent girls and young women (aged 15–24 years) perceived little risk of HIV acquisition, even those who were at highest risk: among those who reported more than eight risk factors, 52% did not consider themselves to be at high risk and 21% did not report any HIV worry (70).

WHY DO MANY MEN IN SOUTH AFRICA AVOID HIV TESTING AND TREATMENT?

Men are generally less likely than women to seek an HIV test and initiate and adhere to treatment (71–76). The MenStar Coalition, launched in 2018, aims to expand the diagnosis and treatment of HIV infection among men, particularly in sub-Saharan Africa.* Contributing to this effort is a study funded by the Bill and Melinda Gates Foundation that is talking directly with men (aged 25–34 years) in South Africa about the barriers and enablers of their HIV-related decisions and behaviours. Testing and linkages to care are emasculating and mired in fear, trauma and loss. Preliminary findings included the following.

Men under pressure

Many of the men interviewed live with tremendous stress and uncertainty, immersed in an unforgiving environment characterized by crime, violence, racial inequality, poverty, unemployment and a lack of access to basic services and infrastructure. Many migrated from their home communities to find short-term or contract employment, leaving them financially unstable and unable to plan for the future. They expressed feelings of fatalism, futility and thwarted ambition—a sense that “everything is stacked against me; I cannot get ahead.” In this context, HIV testing, prevention and treatment may seem pointless or to be yet another form of stress.

Haunted by stigma, unresolved grief and trauma

Many of the men who participated in the study grew up during a time when few had access to HIV treatment. Most had lost one or both parents—as well as other loved ones—to premature death. Often they did not know the cause of death but suspected it was AIDS-related. They have always known HIV as a shameful topic, associated with stigma and taboos. Testing and otherwise engaging with HIV services can trigger traumatic memories and associations.

Hidden fear

The prevailing perception among health-care providers in South Africa interviewed for the study was that men are apathetic, lazy and stubborn. Many of the men interviewed did indeed project a masculine image of brave indifference. However, below the surface, the common emotion was a deep fear of HIV. Much of this fear appeared to stem from threats to masculinity: the men want to be virile—providers, protectors, heads of families and respected community figures—yet they often feel unable to fulfil these roles. Local masculine norms discourage men from expressing or even experiencing fear, preventing them from seeking advice or support. They were less likely to engage when service providers ignored or reinforced their fears.

All of my immediate family are dead. My mum, my dad and my brother all died. I am the only one still living.

Man, aged 32, infrequent tester

Feeling hunted

Men said they often perceived efforts to reach them with HIV services as though they were being hunted. Men who did not actively choose to test felt ambushed by provider-initiated testing. Already lacking control in many areas of their lives, they feared that an HIV-positive diagnosis would result in greater loss of control. Some who tested positive in these circumstances went into denial rather than starting treatment.

Distorted beliefs and perceptions

Many of the men interviewed gauged HIV risk according to appearance and familiarity. A condom may be used during a first or second sexual encounter, but the perceived level of risk—and the need to use a condom—decreased over time. Alcohol use often catalysed poor risk assessment and decision-making, and a negative HIV test result sometimes reinforced high-risk behaviours. Understanding of the benefits of early testing and treatment was poor. Few were aware that effective treatment can prevent onward transmission.

Costs outweigh benefits

Some knew that early treatment can mean a longer and healthier life, but they did not find that compelling in relation to anticipated costs. They feared a positive diagnosis would mean relationship conflict or loss, sexual undesirability, reduced status among peers, loss of pleasures like alcohol and unhealthy foods, and the burden of daily medication. Fear of disclosure—both to their partners and within the broader community—felt particularly threatening, outweighing the fear of potential sickness and death and the burden of lifelong medication.



*I was terrified.
I was not ashamed or
embarrassed;
I was just terrified.*

Man, 28, KwaZulu-Natal, infrequent tester

Finding empathy

The initial results of the study suggest that men in South Africa are commonly perceived as “the problem” and not as multifaceted individuals who come from difficult backgrounds and live under challenging circumstances. An analysis of the results suggests that reaching South African men with HIV testing and treatment may be more effective if they are approached with empathy—a genuine effort to understand the complex set of influences and experiences that shape their attitudes, decisions and behaviours.

The preceding information is based on findings from the first stage of a user-centred research study funded by the Bill and Melinda Gates Foundation and undertaken by PSI, IPSOS and Matchboxology. The study took place in eight districts of South Africa among black African men who were: (a) aged 25–34 years; (b) sexually active; (c) uncircumcised; (d) high school education or less; and (e) a mix of HIV-positive and HIV-negative. To date, the project has conducted ethnographic and qualitative research with 76 men, and it is in the process of conducting a quantitative survey of 2000 men.

* The MenStar Coalition includes PEPFAR, the Global Fund, Unitaid, the Elton John AIDS Foundation, the Children's Investment Fund Foundation, Gilead and Johnson & Johnson.

Failure to return test results

In some cases, testing simply takes too long. A review of recent literature on testing among gay men and other men who have sex with men in Australia, the United Kingdom of Great Britain and Northern Ireland, and the United States identified lengthy waiting times or having to wait or return for test results as barriers to testing (61). Not only does this discourage people from getting tested, but where people do get a test and have to wait for results, there is a greater chance that they will never return for them, never learn their status and never initiate treatment.

A study in China has found that complicated testing procedures and slow results mean that a significant number of people who are screened HIV-positive are lost to follow-up, particularly in rural areas. Over a period of six months in 2013, the proportion of confirmatory testing across the hospitals studied ranged from 14% to 87% (with a mean of 43%), and the average interval within hospitals for individuals to receive completed test results ranged from 14 to 116 days (with a mean of 41.7 days) (77). The longest interval was 260 days. The proportion of newly diagnosed individuals who successfully initiated antiretroviral treatment across the hospitals ranged from 3% to 67% (a mean of 23%), which is clearly inadequate (77).

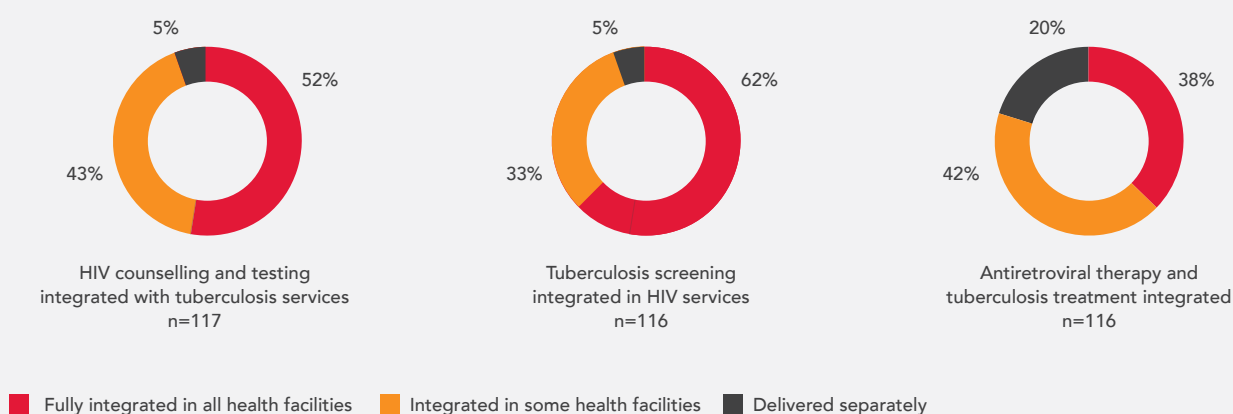
Insufficient integration of testing and treatment for HIV and tuberculosis

Tuberculosis is the leading preventable cause of death among people living with HIV, with some 300 000 [270 000–340 000] people dying from HIV-associated tuberculosis in 2017 (78). It is estimated that 49% of people living with HIV and tuberculosis are unaware of their coinfection and are therefore not receiving care (79). Where diagnosis is delayed, there is increased risk of mortality, especially from multidrug-resistant and extensively drug-resistant tuberculosis (78).

Despite the clear advantages, integration of tuberculosis and HIV services is far from universal. Of the 117 countries that reported data to UNAIDS at the end of 2017, 61 had fully integrated HIV counselling and testing with tuberculosis services, and 72 of 116 reporting countries had fully integrated tuberculosis screening into HIV services. Integration of HIV and tuberculosis treatment was even rarer, with just 44 of 116 countries reporting fully integrated treatment, and 23 reporting that treatment is predominantly delivered separately (Figure 16).

Figure 16. More tuberculosis–HIV integration required

Percentage of countries reporting delivery of integrated HIV and tuberculosis services, global, 2017



Source: 2017 National Commitments and Policy Instrument.

Delays in the initiation of treatment

It is strongly recommended to initiate antiretroviral therapy on the same day as HIV diagnosis, unless the client is unwilling or not ready, or there are clinical reasons to delay treatment (80). However, some of the methods that may help increase the uptake of testing and diagnosis rates—such as home-based, mobile and self-testing—have drawbacks in terms of linking individuals to care, treatment and monitoring. For example, despite the fact that an HIV rapid testing programme in community and outreach settings in Italy was shown to reach key populations who have never been tested before, only 67% of people who inject drugs who were diagnosed with HIV were linked to care (81). A cluster-randomized trial in Lesotho found that linkages to care within one month of testing was around 25% for both home-based and mobile HIV testing (82).

Drug resistance

Suboptimal retention in treatment and care services, drug stock-outs and inadequate support for treatment adherence favour the emergence and transmission of HIV drug resistance (83). The prevalence of acquired non-nucleoside reverse transcriptase inhibitor (NNRTI) resistance among all people on treatment is estimated to be between 4% and 28%; while among people failing treatment it is estimated to range from 47% to more than 90% (84). Acquired drug resistance is also consistently high among children failing treatment (85). In Uganda, for example, up to 98% of children who were identified as failing first-line treatment harboured resistance (86). Levels of pretreatment resistance to NNRTIs (efavirenz or nevirapine) as part of first-line treatment reached 10% or above in six out of 11 countries that reported data to the WHO (84). A modelling analysis estimated that HIV drug resistance over 10% (mean, 15%) would be responsible for 16% of AIDS-related deaths, 9% of new HIV infections and 8% of treatment programme costs in sub-Saharan Africa between 2016 and 2030 (85).

As the scale-up of treatment continues and more individuals receive antiretroviral medicines for treatment or prevention, large-scale treatment programmes will be reliant on newer generation of antiretroviral medications, such as integrase inhibitors, which have a higher barrier to viral resistance than NNRTIs. Adherence support and monitoring of viral load suppression is key to maintaining the robustness of these new regimens. The global community needs to be vigilant against drug resistance and protect the effectiveness of currently available and new antiretroviral medicines.

Lower adherence and higher treatment failure among young people

Young people and adolescents have particular problems in adhering to treatment, and they have higher treatment failure rates. Several studies in sub-Saharan Africa have shown that young people aged 15–19 years are more likely to drop out of HIV care, both before and after starting antiretroviral therapy, than those aged 10–14 years or those older than 20 years. This has been ascribed to stigma, discrimination and disclosure issues, as well as travel and waiting times at clinics (among other reasons) (87–89).

A photograph of a woman holding a baby, overlaid with a blue filter. The woman is wearing a white headscarf with a lace trim and a dark top. The baby is wearing a light-colored dress with a ruffled collar. The background is blurred, showing some foliage.

PART II.

Overcoming barriers

- Rapid diagnosis at the point of care
- More efficient testing through a diversity of approaches
- Active case finding
- Self-testing
- Improving viral suppression
- A rights-based approach

AT A GLANCE

CLOSING GAPS THROUGH ACTIVE, DIVERSIFIED AND RIGHTS-BASED APPROACHES

Safeguarding the right to health of people at risk of HIV and those living with HIV requires the delivery of HIV services that are available, accessible, acceptable, of good quality and delivered according to established human rights principles. A diversity of approaches is needed to reach the diversity of people in need.

Point-of-care early infant diagnosis

New point-of-care technologies for early infant diagnosis are greatly reducing the time between taking a blood sample and the provision to caregivers of the test result. Faster return of results reduces the number of children who are lost to follow-up and allows for more rapid treatment initiation.

Self-testing

The increasing availability of HIV self-test kits is boosting several HIV testing modalities and improving HIV testing among young people, men and key populations.

Multidisease approaches

Multidisease approaches are a more efficient use of health sector resources and a key component of universal health coverage. Multidisease services can also overcome a number of barriers to HIV service uptake, such as stigma and discrimination.

Community-based HIV testing

Community-based testing can overcome many of the logistical, structural and social barriers to HIV testing. Home-based testing by community-care providers in high-prevalence settings and peer outreach to adolescents, young people and key populations are increasing testing yield.

Expanding viral load testing

Viral load testing is far more sensitive than CD4 tests or clinical monitoring, allowing quicker detection of treatment nonadherence or treatment failure. Viral load testing is a critical tool that allows health-care providers to focus their attention on patients with unsuppressed viral loads.

Integrating tuberculosis and HIV services

Evidence from India shows the value of colocating tuberculosis and HIV services. In the states with higher proportions of colocated facilities, more than 90% of tuberculosis patients knew their HIV status, compared to about 50% in the states with lower coverage.

The power of positives

Testing the sexual partners, children and other household and family members of people living with HIV—an approach known as index testing—has been shown to be a particularly effective way to reach groups that are less likely to seek voluntary counselling and testing (such as men and children).

Point-of-care viral load testing

Transportable diagnostic machines can be used to test viral load at the point of care, which can be particularly useful for providing care for hard-to-reach populations, such as people who inject drugs or rural populations.

Rights-based approaches

A human rights-based approach to HIV calls for services to be available, accessible, acceptable and good quality, and delivered confidentially, respectfully and without discrimination. Meaningful participation of affected communities and accountability are key.

RAPID DIAGNOSIS AT THE POINT OF CARE

Revolutionizing early infant diagnosis

The advent of rapid HIV test kits in the late 1990s and their increased use over the last decade has greatly accelerated efforts to improve awareness of HIV status. Their ability to provide an immediate diagnosis has been repeatedly shown to improve linkages to care and reduce the number of people living with HIV who are lost to follow-up (1, 2).

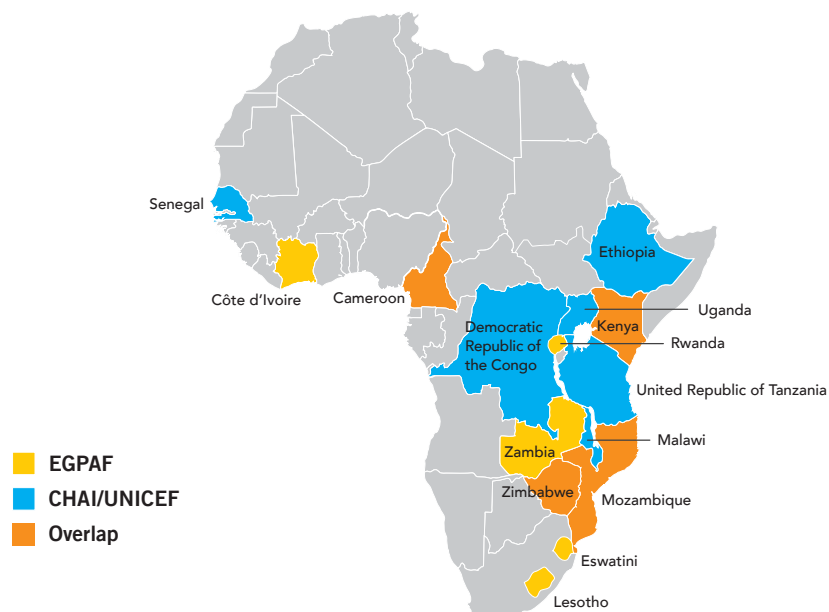
In a similar way, the recent emergence of point-of-care technologies for early infant diagnosis is greatly reducing the time between taking a blood sample and the provision to caregivers of the test result. Faster return of results reduces the number of children who are lost to follow-up and allows for more rapid clinical decision-making and treatment initiation—and fewer AIDS-related deaths (3).

Several point-of-care assays for early infant diagnosis are available for wide-scale use (4).¹ Efforts to use these technologies to deliver timely results and improve infant health outcomes are being informed by a US\$ 150 million investment from Unitaid and support from the African Society for Laboratory Medicine (ASLM), the Clinton Health Access Initiative (CHAI), the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF) and the United Nations Children's Fund (UNICEF) in 15 African countries (Figure 17).

Progress to date strongly suggests that point-of-care early infant diagnosis can play a vital role in starting children living with HIV on treatment before the period of

Figure 17. Ready for scale-up

Fifteen early adopters of point-of-care early infant diagnosis



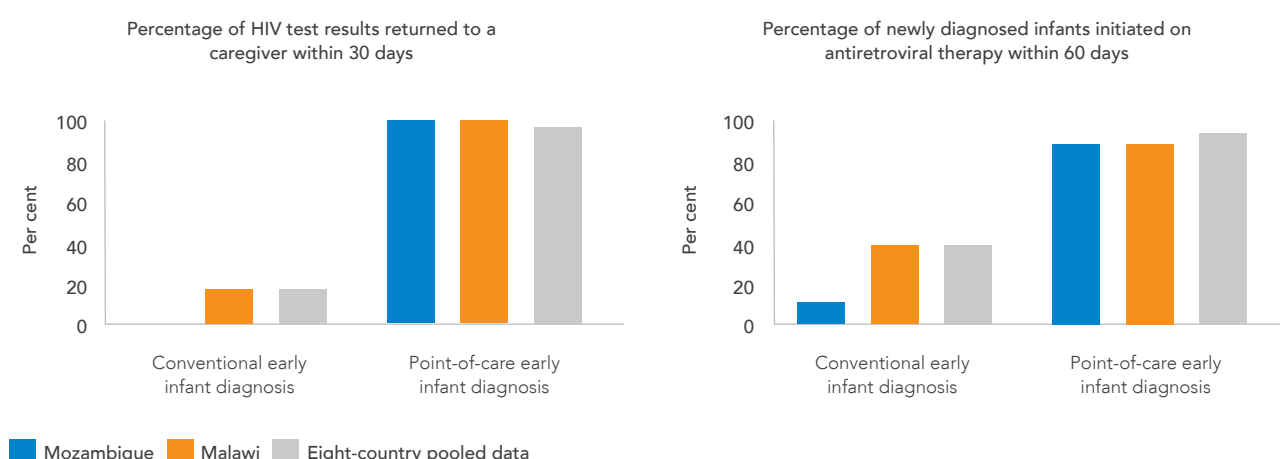
Source: Bailey R, Peter T. The role of point-of-care testing for early infant diagnosis. IAS 2018 satellite session: diagnose, treat, innovate: a paradigm shift for ending paediatric AIDS. 23 July 2018 (http://www.pedaids.org/wp-content/uploads/2018/08/joint-partner-satellite_role-of-POC-EID-23July2018_FINAL_20July2018.pdf, accessed 6 November 2018).

¹ Notably Alere q HIV-1/2 Detect and Cepheid Xpert HIV-1 Qual.

peak mortality at two or three months of age (Figure 18). In Malawi, for example, the introduction of point-of-care early infant diagnosis at seven health facilities reduced the time from sample collection to receipt of results by the infant's caregiver from 56 days to less than a day. Among the infants diagnosed with HIV, the time between sample collection and treatment initiation was reduced from 38 days to less than a day (5). In Mozambique, 89.7% of infants living with HIV who were diagnosed with point-of-care assays initiated antiretroviral therapy within 60 days of sample collection, compared to 12.8% of children who received standard early infant diagnosis. Those who received a point-of-care diagnosis were 40% more likely to be retained in care at 90 days (6).

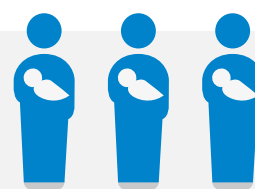
Figure 18. Dramatic gains through point-of-care early infant diagnosis

Percentage of HIV test results returned to a caregiver within 30 days and percentage of newly diagnosed infants initiated on treatment within 60 days, select health facilities, Malawi and Mozambique, 2015–2018



Source: Jani IV, Meggi B, Loquiha O, Tobaiwa O, Mudenyanga C, Zitha A et al. Effect of point-of-care early infant diagnosis on antiretroviral therapy initiation and retention of patients. *AIDS*. 2018;32(11):1453–63; Mwenda R, Fong Y, Magombo T, Saka E, Midiani D, Mwase C et al. Significant patient impact observed upon implementation of point-of-care early infant diagnosis technologies in an observational study in Malawi. *Clin Infect Dis*. 2018;67(5):701–7; and Elizabeth Glaser Pediatric AIDS Foundation, UNITAID. Issue brief: point-of-care early infant HIV diagnosis. In: Elizabeth Glaser Pediatric AIDS Foundation [website]. Washington (DC): Elisabeth Pediatric AIDS Foundation; 2018 (http://www.pedaids.org/wp-content/uploads/2018/07/2018_POCEID_DoingMoreFaster_digital.pdf, accessed 11 November 2018).

At-birth testing increases HIV diagnoses in South Africa and Mozambique



In settings with a high proportion of attended deliveries, adding virological testing at birth to a standard infant testing strategy can enable (a) earlier and wider provision of HIV testing services to mothers and babies who may not return to the health facility for early infant diagnosis and (b) reductions in mortality among infants living with HIV (7). South Africa introduced at-birth testing in June 2015. Over the first year of implementation, the national monthly birth testing coverage increased from 39% (8636 tests) to 93% (20 479 tests), and the number of positive tests at birth increased from 114 to 234 per month (8).

In Mozambique, point-of-care testing at birth was found to be accurate and feasible when performed by nurses in low-resource primary health-care clinics. Infants born to HIV-positive mothers at eight primary health-care clinics were tested within 24 hours of delivery using an on-site point-of-care test or a standard laboratory test. The sensitivity and specificity of the two tests were statistically equal, and the point-of-care assays provided mother–infant pairs with immediate test results and, when needed, initiation of follow-up care before discharge from maternity wards (9). The results suggested that the use of the point-of-care early infant diagnosis could link up to 81% more HIV-positive infants to timely care in Mozambique, compared to the standard test (9). The findings reinforced evidence that testing at both birth and at 4–6 weeks may increase the proportion of HIV-infected infants diagnosed compared to the current practice of a test at only 4–6 weeks.

A cost-effective and innovative approach

The introduction of point-of-care technologies requires additional investment, including a higher cost per test conducted (at current prices for reagents or cartridges). However, when comprehensive operational costs are taken into account, point-of-care testing is cost-competitive when compared to testing delivered through conventional laboratory-based technologies (3, 10). Point-of-care testing requires fewer procedural steps, simpler infrastructure, fewer trained operators and fewer commodities. The cost per result returned to the caregiver is the same or lower due to the much higher rate of return of results: results that are not returned waste both time and resources (3, 11, 12). A higher rate of return also means that fewer children are lost to follow-up. Across 538 sites in nine countries, the cost per result returned within 30 days was US\$ 37.89, compared to US\$ 131.02 for conventional early infant diagnosis (13).

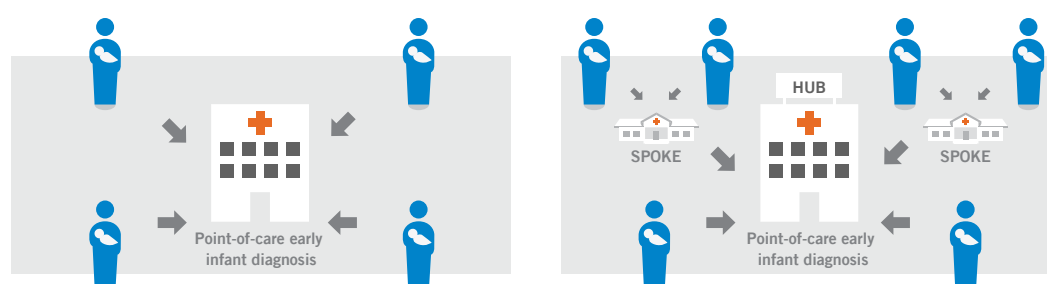
Hubs and spokes for scale-up

A forecast of the demand for HIV-related diagnostics as low-income and middle-income countries strive to reach global targets found that the number of early infant diagnosis tests should rise from 1.2 million in 2016 to 2.1 million in 2021, an increase driven primarily by wider testing at birth (14). This forecast also includes an assumption that the share of the overall early infant diagnosis testing volume point-of-care assays will increase from 5% in 2016 to 25% by 2020 (14). Making this forecast a reality will require the mobilization of adequate funding and the efficient distribution of human and financial resources to fill the gaps in the paediatric testing and treatment cascade.

Mobilizing sufficient resources to purchase a point-of-care diagnostic instrument for every prevention of mother-to-child-transmission clinic within high-prevalence countries is probably unrealistic with the current technologies—many of these sites are seeing less than one infant per week. EGPAF, which is supporting the scale-up of point-of-care early infant diagnosis in nine countries, is maximizing the use of available resources through a short-haul, hub-and-spoke service delivery model that greatly expands coverage in underserved areas.² Point-of-care diagnostic instruments are placed in a centrally located facility (the “hub”), and smaller health outposts (the “spokes”) within an hour’s distance deliver samples to the hub for testing. The results are returned back to the spoke sites (Figure 19) (13). The model successfully extends access to early infant diagnosis and provides faster diagnoses than would be possible through referral to laboratory-based assays, and it does so without compromising care. The median time for sample collection, transport of the specimens to hubs for testing and receipt of results back at the spoke facilities for patient management is two days (13, 15, 16).

² Cameroon, Côte d’Ivoire, Eswatini, Kenya, Lesotho, Mozambique, Rwanda, Zambia and Zimbabwe.

Figure 19. Making the most of limited resources
Hub-and-spoke service delivery model



Stand-alone sites

Receive samples directly from infants and perform point-of-care early infant diagnosis tests on site.

Hub-and-spoke networks

Hub sites provide testing for infants at that site and for spoke sites. Nearby spoke sites send samples to the hub sites for testing.

MORE EFFICIENT TESTING THROUGH A DIVERSITY OF APPROACHES

Facility-based voluntary counselling and testing is the foundation of efforts to provide adolescents and adults living with HIV the treatment they need to live long and healthy lives. Increased focus over the last decade on provider-initiated HIV testing—when individuals are offered an HIV test during visits to health-care providers—has greatly increased diagnoses of people living with HIV who are previously unaware of their status.

The vast majority of HIV diagnoses are made through voluntary and provider-initiated testing. Offering HIV tests to clients at a range of health-care services—including services for sexually transmitted infections, viral hepatitis, tuberculosis, immunization, malnutrition, antenatal and paediatric care and all services for key populations—is an efficient and effective way to identify people with HIV (17). However, the yield of HIV-positive diagnoses from these facility-based testing modalities remains low. Many low-risk individuals are tested, and many of those who are living with HIV are diagnosed after showing symptoms of immunodeficiency, years after acquiring the virus. Passively waiting for people to make the sometimes considerable effort to visit a health clinic does not achieve the rates of knowledge of status called for in the 90–90–90 targets. A more active and diversified approach is needed to fill the remaining gap.

HIV testing volume: The number of HIV tests conducted.*

HIV testing positivity: The number of HIV-positive results returned to people.

Positivity rate: HIV testing positivity divided by HIV testing volume over a period of time.

HIV testing yield: The number of people newly diagnosed.

Percentage yield: HIV testing yield divided by HIV testing volume over a period of time.

* Only tests conducted where the results are returned to the person should be counted. Also, a person should only be counted as testing once, even if multiple test kits are performed to confirm an HIV-positive diagnosis according to the national testing algorithm.

Community-based HIV testing

Rapid HIV test kits can be used to make an HIV diagnosis just about anywhere, liberating HIV testing from the confines of health facilities. Community-based testing can overcome many of the logistical, structural and social barriers to HIV testing. It can reach people who live far away from a health facility, provide services at times that suit people at high risk of HIV infection, and mitigate the stigma and discrimination that can accompany HIV testing and a positive diagnosis.

Community-based testing can be delivered by trained community members or health-care workers. Services can be provided in places such as churches, mosques or other faith settings; entertainment venues (such as bars and clubs); cruising sites and saunas; schools or workplaces; or the privacy of the home. Tests can be offered continuously, on a regular schedule, as a one-time or occasional promoted event, or as part of public events, such as sporting events, music or theatre performances, agricultural fairs and holiday festivals. They also can be specifically designed to serve young women, men and boys, or key populations, and they can be supported and bolstered by mobile and online technologies.

Multiple ways to reach communities in need



Mobile testing: Delivered by vehicles or individuals travelling by foot with a backpack, mobile outreach testing services travel to the communities at greatest need.

Event-based testing: Typically consists of clinic staff conducting outreach at public events or within a community's public space (e.g., a village square), often in tents or other so-called pop-up structures, to educate people about HIV testing and to provide HIV counselling and testing services.

Home-based testing: Testing counsellors move door-to-door to test a population within areas of high HIV prevalence. Home-based testing has been shown to be both feasible and acceptable in these settings.

Peer outreach: Testing services delivered by specially trained peers who have the cultural competence to engage effectively with hard-to-reach groups, such as key populations and adolescents.

Reaching men in Malawi with mobile and event-based testing

In southern Malawi, seven Global AIDS Interfaith Alliance (GAIA) Elizabeth Taylor Mobile Clinics provide same-day testing and treatment for HIV, malaria and other health conditions in two remote, high-prevalence districts where the population faces considerable barriers in accessing basic health care. The clinics operate from churches, schools or community buildings, reaching 35 sites each week, and they serve more than 900 000 villagers within an hour's walk from their home. Since the program's inception in 2008 through 2017, the seven clinics have conducted more than 1.35 million client visits (264 000 in 2017 alone) for health services, including testing 46 110 people for HIV, of whom 4927 (11%) were diagnosed with HIV (18).



8.017 89574 106

Result	Interpretation
Two red lines (C and T)	Positive result
One red line (C)	Negative result
No red lines	Invalid result

More

HIV-1

1/2

HIV-1

In 2013, it was noted that only 26% of the people tested for HIV at the mobile health clinics were men, and that many of the men who tested for HIV were suffering from AIDS-related illnesses—strongly suggesting they were being diagnosed very late. Following research to increase understanding of testing influences and the preferences of men, GAIA now holds male-focused testing events and community sensitization meetings at times and locations convenient to men, such as on weekends, at worksites (tea estates, construction sites and markets), at places of worship (churches and mosques), at community sites (schools and community centres), or at sports events. The project employs male HIV testing counsellors and improves confidentiality by rotating its counsellors.

From 2014 to 2017, GAIA has held 106 male-targeted testing events, at which they tested 6166 people. Of those tested, 71% were men. Among young men (aged 15–24 years), 42% had not previously been tested and 1.2% tested positive. Among men aged 25 and older, 20% had not previously been tested and 5% tested positive. All men who attend receive counselling and are screened for HIV risk.

Men who test positive are referred for confirmatory testing and treatment initiation, and they are encouraged to ensure that their sexual partners and children seek testing. Those who test negative and are eligible are referred to voluntary medical male circumcision and other prevention services. Through a partnership between the Elizabeth Taylor AIDS Foundation and PEPFAR, the programme was expanded in March 2018, with two clinics now holding 10 events a week in the highest risk areas and at male worksites (19).

Reaching adolescents and key populations through peer outreach

Testing services delivered by peers can increase the reach, uptake and acceptability of testing. Peer educators can also provide pre-test and post-test counselling and act as peer navigators, helping newly diagnosed people living with HIV to understand and cope with their diagnosis and to link with care and treatment services. Beyond actually providing services, information, education and skills, peers can act as role models and offer nonjudgemental and respectful support that can help reduce stigma, facilitate access to services and improve service uptake. Trained peer providers may reach more people because they often are more culturally competent at talking with their peers, particularly people from key populations and adolescents (17).

In Thailand, it has been shown that peers who received a three-day intensive training course on how to perform finger-prick blood collection and a rapid diagnostic test can achieve comparable results to health-care workers. A sample of 1680 HIV tests conducted by these lay providers at six community-based organizations providing services to gay men and other men who have sex with men and transgender women and men resulted in a 15% testing yield. All of the positive tests—and a random sample of 10% of the negative tests—were retested by professional health-care workers. There was 100% concordance between the tests performed by the lay providers and those by the health-care workers (20).

In Nigeria, self-identified gay men and other men who have sex with men have been recruited to serve as key opinion leaders and trained to reach their peers for self-testing and linkages to care. This pilot effort found that distributing HIV self-testing kits through key opinion leaders was efficient, reaching individuals with reported HIV risk behaviours, including those with a high number of sex partners, different types of sex partners, incidences of unprotected sex and high self-perceived risk of HIV (21). It also found that 17.9% were first-time testers.

Achieving the 90–90–90 targets through home-based HIV prevention, testing and treatment

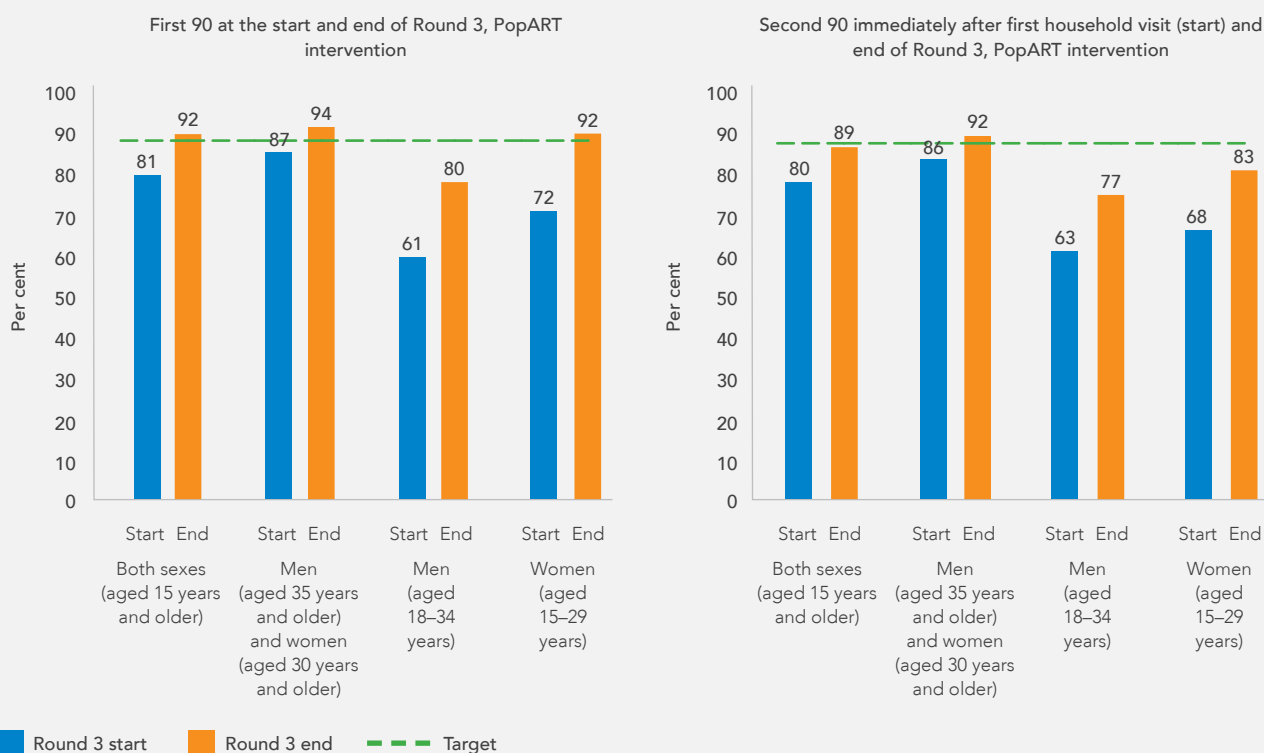
PopART (HPTN 071), a cluster-randomized trial conducted in 21 urban communities in South Africa and Zambia with a total population of about 1 million people, recently completed its field work (22). Community care providers in the PopART intervention communities conducted annual rounds of a combination HIV prevention package that included home-based voluntary HIV testing and counselling; they also supported linkages to care and treatment retention for people living with HIV in the communities. Additional services delivered by the community care providers included distributing condoms, screening for sexually transmitted infections (STIs) and tuberculosis, and promoting voluntary medical male circumcision for HIV-negative men and services to prevent mother-to-child transmission for women living with HIV.

At the end of the third of three annual rounds of service delivery (completed in December 2017), the estimated number of adults living with HIV reached was 9332 men and 17 861 women. In the study communities of Zambia, it was estimated that 87% of men living with HIV and 94% of women living with HIV knew their HIV status, and among those who knew their HIV status, 88% of men and 89% of women were accessing antiretroviral therapy. In the study communities of South Africa, it was estimated that 86% of men living with HIV and 95% of women living with HIV knew their HIV status, and among those who knew their HIV status, 85% of men and 92% of women were on treatment (23).

The trial has achieved the first two of the 90–90–90 targets (90% knowledge of HIV status and 81% treatment coverage among all people living with HIV) overall, exceeding these targets among older adults. However, gaps remain among men aged 18–34 years and women aged 15–29 years (Figure 20), indicating that further efforts are needed to reach younger adults (and particularly younger men) (23).

Figure 20. Reaching the first two 90s

PopART intervention: Knowledge of HIV status among people living with HIV (first 90) and treatment coverage among those who know their HIV status (second 90), by age and sex, before and after Round 3 community-based services and household visits, Zambia and South Africa, 2017.



Source: HIV Prevention Trials Network (HPTN). Data provided to UNAIDS on 15 November 2018.

Peer CATS provide broad support to young people living with HIV in Zimbabwe

Peer-driven models in which adolescents and young people mobilize their social networks for testing may be particularly important in overcoming the potential challenges of school-based testing in high-prevalence settings. Peers have increased credibility, the ability to speak from their own experiences and the potential to reach individuals in their social and sexual networks who do not or cannot engage with health-care settings (24). In Zimbabwe, Africaid's Zvandiri programme has established safe places where adolescents and young people living with HIV can come together to learn about their condition, share their experiences and provide each other with support (25). The programme trains adolescents and young people living with HIV (aged 17–23 years) to serve as Community Adolescent Treatment Supporters, or "CATS." These CATS provide information, counselling and support to their peers through home visits, clinic visits, support groups and mHealth (mobile health). Children and adolescents in need of HIV testing services are identified by CATS through community mobilization activities and index case finding. CATS ensure they are linked to testing, and after the test, they provide follow-up services. Young people who test HIV-negative are linked to prevention services, while those who test positive are provided post-test counselling and supported to initiate HIV treatment and care, and to access services for disclosure, nutrition, sexual and reproductive health, mental health, disabilities and social protection (26).

In 2014, Zvandiri was providing services to 5009 adolescents living with HIV in 18 districts, representing 9% of all adolescents on treatment in Zimbabwe (25). An independent evaluation of the Zvandiri programme—which includes monthly community-based support groups, community outreach, CATS, youth-friendly clinics, income-generating projects, parent/caregiver support, advocacy campaigns and youth-friendly training for health workers—documented a range of positive outcomes, including the following:

- Community-clinic links that strengthened the HIV testing and treatment cascade, including uptake of testing and linkages and retention in care.
- Psychosocial well-being, including resilience, confidence and youth empowerment.
- Improved linkages to child protection services.
- Stronger child-friendly and youth-friendly health service provision.
- Improved capacity of families and communities to support children and young people with HIV.
- Support for HIV prevention and sexual and reproductive health efforts.
- Reduced incidence of drug resistance, treatment failure and transmission of resistant virus.
- Long-term cost benefits through contributions to HIV prevention and improved sustainability of treatment and care, with reduced opportunistic infections and need for second-line or third-line antiretroviral regimens (25).

An enhanced peer outreach approach

The USAID-funded LINKAGES project uses an enhanced peer outreach approach to provide a range of health and wellness services, including HIV testing and treatment, to previously unidentified members of key populations (27). The approach explores the vast and complex spectrum of individuals within key populations, and then focuses on those who are hard to reach, may be at high risk of HIV acquisition or are already living with HIV (such as older gay men, non-gay identified men who have sex with men who are married to women, and female sex workers who meet clients over the Internet). The goal is to reach untapped networks, increase the rate of HIV diagnoses, link people living with HIV to care and treatment, and connect members of key populations who test negative to services that will help them remain HIV-free.

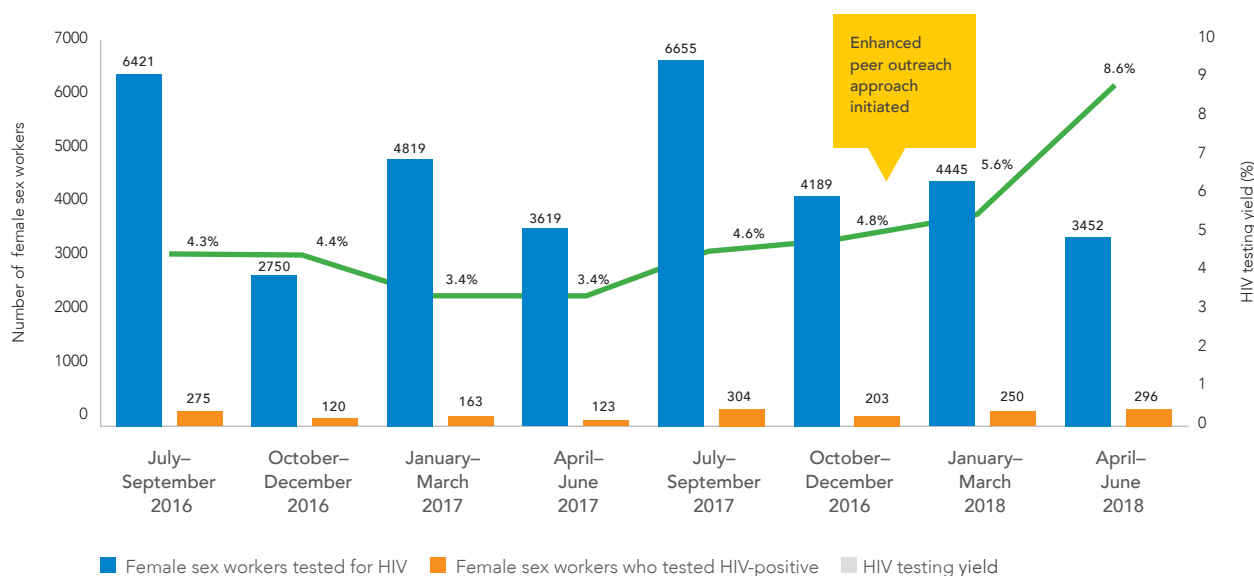
The enhanced peer outreach approach is being implemented among female sex workers, transgender women and men and gay men and other men who have sex with men in Angola, Botswana, Burundi, Côte d'Ivoire, Democratic Republic of the Congo, eastern Caribbean, Eswatini, Haiti, India, Jamaica, Lao People's Democratic Republic, Malawi and Thailand. The approach has proved successful, with a consistent increase in HIV testing yield across countries and key population groups (28). In Democratic Republic of the Congo, for example, HIV testing yield among female sex workers nearly doubled after the enhanced peer outreach approach was initiated (from 4.8% in late 2017 to 8.6% in mid-2018) (28). About 500 fewer tests were conducted, but nearly 100 additional women living with HIV were diagnosed (Figure 21).



Credit: ZUMA Press, Inc. / Alamy Stock Photo

Figure 21. Increased testing yield among female sex workers

Number of HIV tests, HIV-positive results and testing yield, female sex workers reached by the LINKAGES project, Democratic Republic of the Congo, 2016–2018



Source: USAID, FHI360, PEPFAR. LINKAGES project, October 2018.

Key populations living with HIV find more new cases in Haiti

In Haiti, analysis of LINKAGES project data found that HIV-positive peer mobilizers were far more likely to identify previously undiagnosed people living with HIV for testing. Among female sex workers, testing yield from HIV-negative peer mobilizers was 19%, compared to 34% for peer mobilizers living with HIV. HIV-positive gay men and other men who have sex with men were 40% more likely to recruit an undiagnosed peer (Figure 22) (28). This observation led to the recruitment of more people living with HIV as mobilizers.

Figure 22. The power of positive peers

HIV testing yield from HIV-positive and HIV-negative peer mobilizers, Haiti, April–June 2018



Source: USAID, FHI360, PEPFAR. LINKAGES project, October 2018.

ACTIVE CASE FINDING

The results from the LINKAGES project in Haiti reflect the fact that one of the most effective ways to reach undiagnosed people living with HIV is to work with or through those who have already been diagnosed. This method—called index testing—has been shown to be a particularly effective way to reach groups that are less likely to seek voluntary counselling and testing (such as men and children).

Index testing: HIV testing for the sexual partners, children and other household and family members of a person living with HIV (the index case).

Partner notification: Newly diagnosed individuals consent to disclose their HIV-positive status to their sexual or drug-using partner(s), or they notify them anonymously with assistance from a trained provider. The partners are then offered HIV testing.

In 2016, for example, district health systems in Malawi asked people living with HIV who were receiving treatment to bring family members to family testing days in 90 health facilities in six districts. As a result, 25 572 family members were tested over a 13-month period in 2016 and 2017. Of all those tested using this method, 22% tested positive, much higher than the national average yield of 4%. Study data suggest that most index cases were women and that this initiative increased the testing yield among men. Among adults aged 15–49 years, 39% of men tested HIV-positive compared to 28% of women. The approach also brought significantly more children for HIV testing, with 27% of all people tested being children (compared to 16% during routine testing in 2017) (29).

Partner notification

Partner notification is a specific component of index testing. Partner notification services can be passive, where a trained provider helps newly diagnosed individuals to disclose their HIV status to their sexual or drug-using partners and to encourage those partners to seek testing. Partner notification can also be active, where a trained provider accompanies the person during disclosure and then offers HIV testing to the partner (30).

Since 2016, WHO has recommended that voluntary assisted partner notification services be part of a comprehensive package of testing and care offered to people with HIV (30). There is considerable evidence that such services increase the uptake of HIV testing among partners of people living with HIV, the proportion of HIV-positive people being diagnosed and the linkages to care among partners of HIV-positive individuals (30). A systematic review of studies covering eight countries and a total of 5150 index patients found that assisted partner notification resulted in a 1.5-fold increase in HIV testing uptake and reached 1.5 times more HIV-positive partners than other approaches (passive partner notification or no partner services) (31).



An integrated HIV testing approach

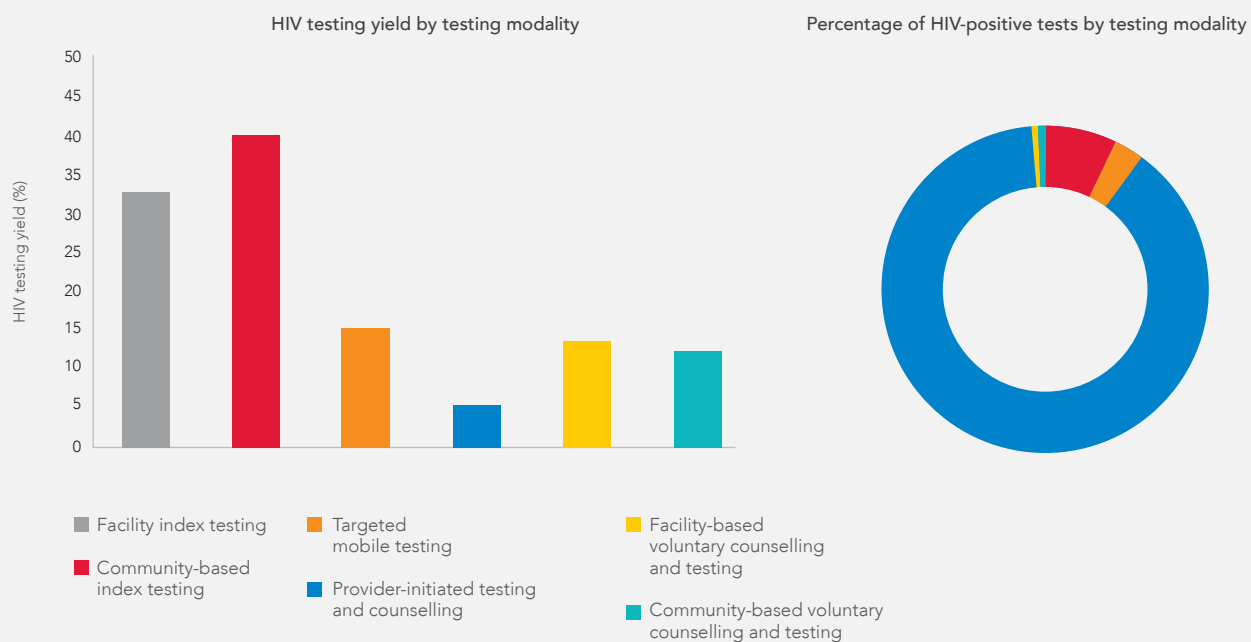
Achieving high rates of knowledge of status requires a mixture of testing modalities appropriate to the local context. In Zimbabwe, for example, epidemiological surveillance data and treatment programme data have been used to divide districts supported by PEPFAR into three categories—high treatment gap, low treatment gap and no treatment gap—based on the estimated number of people living with HIV who are not accessing antiretroviral therapy (32).

An integrated HIV testing approach is used to tailor a mixture of testing modalities to each district based on the gap category and demographic makeup of the population. Facility-based provider-initiated HIV counselling and testing is intensified in districts with larger treatment gaps, as the volume of diagnoses is higher and the cost of service delivery lower through this modality. Among districts where the gap is smaller, more costly higher yield modalities—such as self-testing, targeted mobile testing and sexual network tracing—are emphasized. Across all districts, index testing for the sexual partners and children of all known people living with HIV is being intensified, reflecting the high positivity yield of this approach (32).

Between October and December 2017, provider-initiated HIV counselling and testing accounted for 89% of all diagnoses in PEPFAR-supported districts, and the yield was 5% (33). By comparison, community-based index testing had a yield of 40%, but it accounted for just 7% of diagnoses (Figure 23). In 2017, an estimated 85% [73– >95%] of people living with HIV in Zimbabwe were aware of their HIV status.

Figure 23. Balancing volume and yield

Percentage yield and percentage of HIV-positive tests, by modality, Zimbabwe, October–December 2017



Source: Timberlake J. COP 2018 agency oversight and SGAC approval meeting, Zimbabwe. Presentation prepared prior to COP 2018 approval. PEPFAR; 18 April 2018.

The potential for intimate partner violence or social harm following partner notification is a concern. Individuals or couples who report intimate partner violence in their current relationship should be counselled, and caution should be exercised in settings where key populations are criminalized or face high levels of stigma and discrimination. However, reported social harm and other adverse events following HIV partner notification using passive or assisted approaches have been rare (30).

In Ukraine, sexual and injecting drug use network tracing has been used by the Transmission Reduction Intervention Project (TRIP) to diagnose members of key populations who recently acquired HIV. Potentially recently infected individuals were recruited in Odessa and asked to refer individuals from their risk networks: sexual partners, drug-injecting partners, people who were present while they were having sex or using drugs, and people recruited from small-size venues where participants went to inject drugs or locate sex partners. These networks were found to have higher undiagnosed people living with HIV (14.6%) than a recent integrated biological and behavioural survey (5.0%) or standard outreach testing (2.4%) (34). Project managers have not reported any adverse events related to the network testing model; on the contrary, they have reported positive support from the friends and families of diagnosed individuals (35).

SELF-TESTING

HIV self-testing: A process whereby an individual collects his or her own specimen (oral fluid or blood) and then performs a rapid HIV test and interprets the results. A single reactive self-test result is not a diagnosis of HIV. Such a result needs to be followed by further testing and confirmation of HIV status by a trained provider in a facility-based or community-based setting (30, 36).

The roll-out of affordable HIV self-testing is certain to play an important role in achieving the global target of 90% of all people living with HIV knowing their HIV status. Self-testing provides an opportunity to test discreetly and conveniently, making it particularly useful for people who wish to avoid other testing modalities. Self-test kits can also be distributed widely, reaching areas far from health facilities.

The diagnostic accuracy of self-test kits is high, and self-testers can achieve the same screening results as a health-care worker, whether or not assistance is provided (37). The primary challenge with self-testing is linkages to post-test counselling, confirmatory testing and the initiation of treatment. Providing self-testing in situations where there is no access or poor linkages to treatment and care has limited benefits for people living with HIV. There also are concerns that self-testing may expose vulnerable persons to testing coercion, in violation of the need for consent.

National HIV testing programmes must ensure that protections are in place to ensure that the rights of persons in self-testing situations are respected (38, 39).

Trained personnel, whether in health-care facilities or the community, are needed, as is the incorporation of evidence-informed linkage strategies; this will ensure that self-testers are linked to the necessary follow-up services (30). When these elements are incorporated, the addition of self-testing has consistently boosted knowledge of HIV status in low-prevalence and high-prevalence settings, and in urban and rural areas.

Directly assisted self-testing

Assisted self-testing interventions vary in terms of the intensity of support and the technologies used, depending on the population in question. For example, people living in rural communities and populations with disabilities or low literacy levels may particularly require direct assistance in the form of in-person demonstrations and explanations before, during and after self-testing (30).

In Mozambique, directly assisted oral HIV self-testing was successfully piloted among rural young men aged 16–20 years. Seventy per cent of the nearly 300 participants were first-time testers. The positivity rate was 1.7%, and there were no false negative or false positive results from the oral HIV self-test. The study found that 20% preferred self-testing at home, while three quarters (76%) preferred assisted self-testing at a health facility (45).

In Bangkok, Thailand, the Service Workers in Group Foundation (SWING) includes peer-assisted HIV self-testing within a range of free services for STIs and HIV that are provided to sex workers of all genders. SWING outreach workers directly support confirmatory testing and linkages to care for clients who test positive, and they stay connected to clients who test HIV-negative, supporting them with safe sex education, condom promotion and regular HIV testing (46).

A self-test surge in China

There has been a surge in the use of HIV self-testing among gay men and other men who have sex with men in China, where low testing rates within this key population have been the norm. According to one survey of 400 Chinese gay men and other men who have sex with men, 19.2% reported point-of-sex self-testing use in 2017 (40). Other data suggest that nearly a third (29%) of Chinese gay men and other men who have sex with men used self-testing in 2017; in another trial, about half (49%) used self-testing between August 2016 and July 2017 (41, 42).

In another project, grass-roots organizations collected urine from gay men and other men who have sex with men. About 70% of the samples were mailed back to the laboratory; of these, 96.7% were tested with a positivity rate of 7.1% (not including previously identified infections). The study estimated that the project's HIV positivity rate was nearly 90 times the rate in routine HIV testing. However, return of results and linkages to care was a major issue: less than two thirds of the reactive tests (61.7%) led to a confirmatory test, and more than one quarter (26.7%) were successfully referred to antiretroviral therapy (43).

China's scale-up of self-testing has experienced other challenges, including a lack of quality assurance for self-tests, a lack of national guidance on the use of self-testing and concerns about the sustainability of self-testing promotion (which is currently undertaken primarily by community groups) (44).

Unassisted self-testing: Individuals use only a self-test kit that includes manufacturer-provided instructions for use.

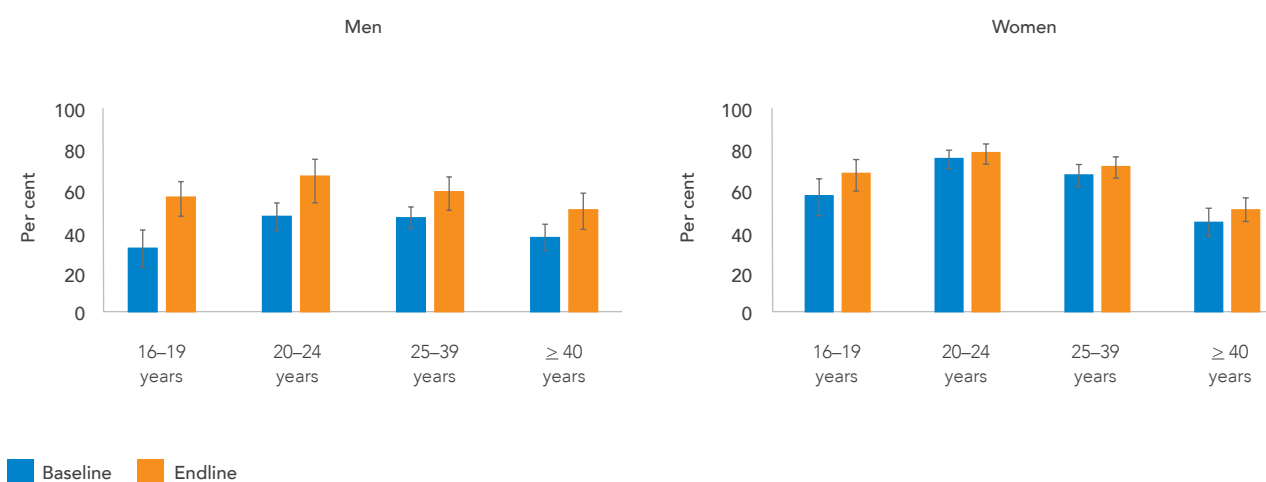
Directly assisted self-testing: Trained providers or peers give individuals an in-person demonstration before or during the self-test of how to perform the test and interpret the result. This is provided in addition to the manufacturer-supplied instructions for use and other materials found inside the kit. Directly assisted self-testing can take place in health facilities or in the community (30).

Bringing self-testing to scale

Unitaid's US\$ 48.7 million HIV Self-Testing Africa (STAR) project, administered by Population Services International (PSI) in partnership with WHO, is rolling out HIV self-testing in six countries within eastern and southern Africa. The first phase of the project (2015–2017) distributed more than 750 000 HIV self-testing kits and increased testing coverage by 21–35% among men and 22–28% among women (47, 48). Gains were particularly strong among young men (Figure 24). In addition to the first-phase countries of Malawi, Zambia and Zimbabwe, STAR has since expanded to include Eswatini, Lesotho and South Africa. In the first six months of 2018, 725 230 kits were distributed across the six countries, of which 53% went to young people (aged under 29 years) and 58% to men and boys (49).

Figure 24. Coverage gains through self-testing

Percentage of people who said they had not had an HIV test within the last 12 months, four districts*, Malawi, 2015 baseline survey and 2017 endline survey



Source: Karin Hatzold, STAR Project Director, Population Services International. HIV self-testing Africa: experiences from HIVST implementation in 6 countries in sub-Saharan Africa. Presentation. 2018.

* Blantyre, Machinga, Mwanza and Neno.

STAR uses self-testing to increase the uptake and frequency of testing among many of the populations missed by existing services, particularly key populations, men and young people (48). STAR's self-testing kits are distributed free of charge through a range of strategies, including door-to-door distribution by lay community-based distribution agents and peer distribution for female sex workers. STAR's promotion efforts and the kits themselves include clear messages that a self-test does not provide a definitive HIV-positive diagnosis, and the kits also include self-referral cards with the name and contact details of a local health facility for confirmatory diagnosis. Local kit distributors are trained to provide encouragement, support and referral.

Efforts to reach men include the distribution of self-test kits in male-dominated workplaces and transport hubs, or the use of HIV self-testing as part of demand creation for voluntary medical male circumcision. Fear of a positive HIV test result—and fear of testing—can prevent adult men from taking up voluntary medical male circumcision; offering self-testing can reduce this barrier and increase motivation (49).

Improving linkages to care

There are a number of strategies to improve confirmatory tests and linkages to care after self-testing:

- Self-testing kits can be distributed with brochures and flyers that contain information about HIV testing services, prevention, treatment and care (as well as about other diseases, such as tuberculosis, STIs and viral hepatitis).
- Accompanying information can include telephone hotlines, which can provide referrals and linkages to HIV testing and other services, as well as to nonmedical services (such as legal support and support for survivors of intimate partner violence).
- Peer and outreach workers can conduct follow-up—including post-test counselling and referral to confirmatory testing services—in person, by phone, or through text or social messaging.
- Clients of outreach workers can be given appointment cards and referral slips for HIV service providers. They also can be provided with vouchers, coupons or discounts in instances where long distances, costly transportation and other barriers may prevent them from following up on a positive result.
- Newer technologies can also be used, including mobile phone text message services and Internet-based and computer-based applications that provide information, reminders, videos and messages encouraging linkage following self-testing. The latter can also include live online counselling services or programmes that enable users to follow instructions on what to do following a reactive self-test result.
- Self-testing plus home-based treatment assessment and initiation—with support and follow-up through community-based networks—may be a particularly effective approach in some settings (30).

The STAR project is investigating ways to maximize linkages to care after a positive self-test. In Zimbabwe, financial incentives were given to community volunteers, who distributed self-testing kits door-to-door for four to six weeks in 38 rural wards. These community agents received either a one-time payment of US\$ 50 or the same US\$ 50 payment plus US\$ 0.20 for each client linked to confirmatory HIV testing, noncommunicable disease screening, family planning or voluntary medical male circumcision. This pilot showed a significant rise in treatment initiation in communities with self-testing versus those communities without, regardless of the type of incentive used. The additional per client incentives increased linkages to confirmatory testing in HIV-positive participants not already on treatment by 59% (75.8% in communities with volunteers who received both the stipend and the incentive, compared to 50% in communities with volunteers who only received the stipend) (50).

Self-testing and active case finding

Self-testing can strengthen efforts to notify and test the sexual partners of recently diagnosed people living with HIV. Pregnant women and lactating mothers who test positive at antenatal care and mother-and-child clinics are provided self-testing kits to give to their male sexual partners (49). In Uganda, the majority of pregnant women taking part in an oral HIV self-test trial in antenatal clinics reported that they had successfully delivered self-testing kits to their male partner, indicating that the use of self-tests to increase HIV testing among men is feasible (51). STAR has reported that enhanced index testing and partner notification increase the likelihood of the sexual partner(s) taking up HIV testing, and there is evidence that a high proportion of partners are testing positive (49).



Credit: Directphoto Collection / Alamy Stock Photo





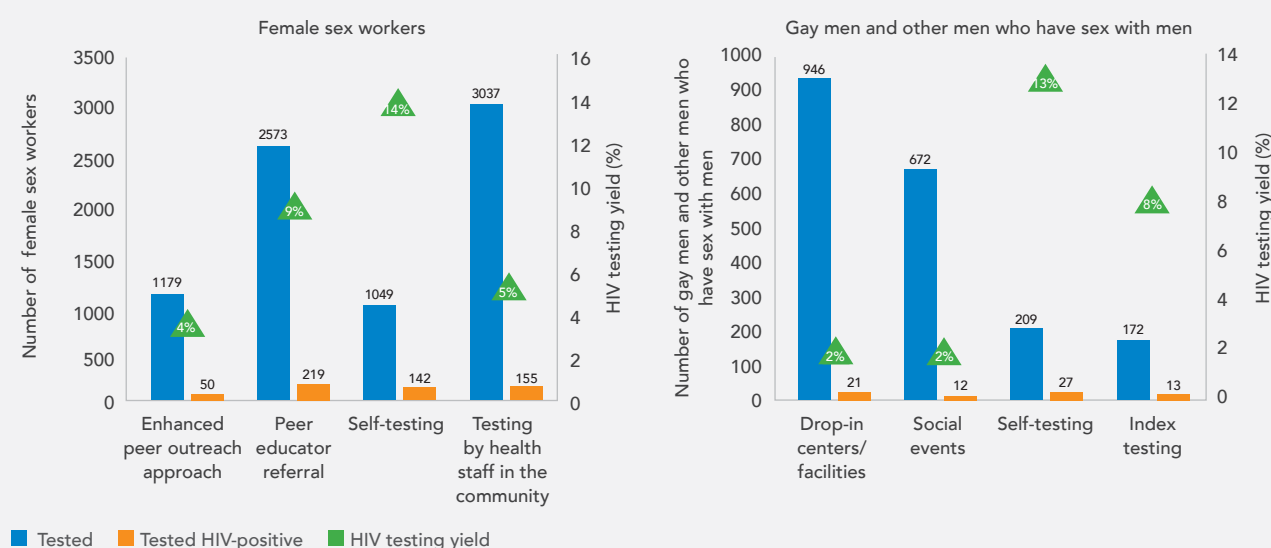
Self-testing brings a high yield of HIV diagnoses to enhanced peer outreach in Burundi

HIV self-testing has been added to the variety of HIV testing options provided by the LINKAGES enhanced peer outreach programme in Burundi. Female sex workers, transgender women and men and gay men and other men who have sex with men were reached by peers and offered the option of a peer-assisted self-test. If the test is reactive (a positive result), the peer brings the individual to a key population-friendly testing facility for a confirmatory test.

The yield from this modality—16% for female sex workers and 13% for gay men and other men who have sex with men—has been much higher than other testing modalities (Figure 25) (28). Data from across the cascade of testing and treatment services shows that high percentages of individuals who have a reactive self-test are confirmed HIV-positive and initiate antiretroviral therapy (Figure 26) (28).

Figure 25. High yield from peer-assisted self-testing for key populations

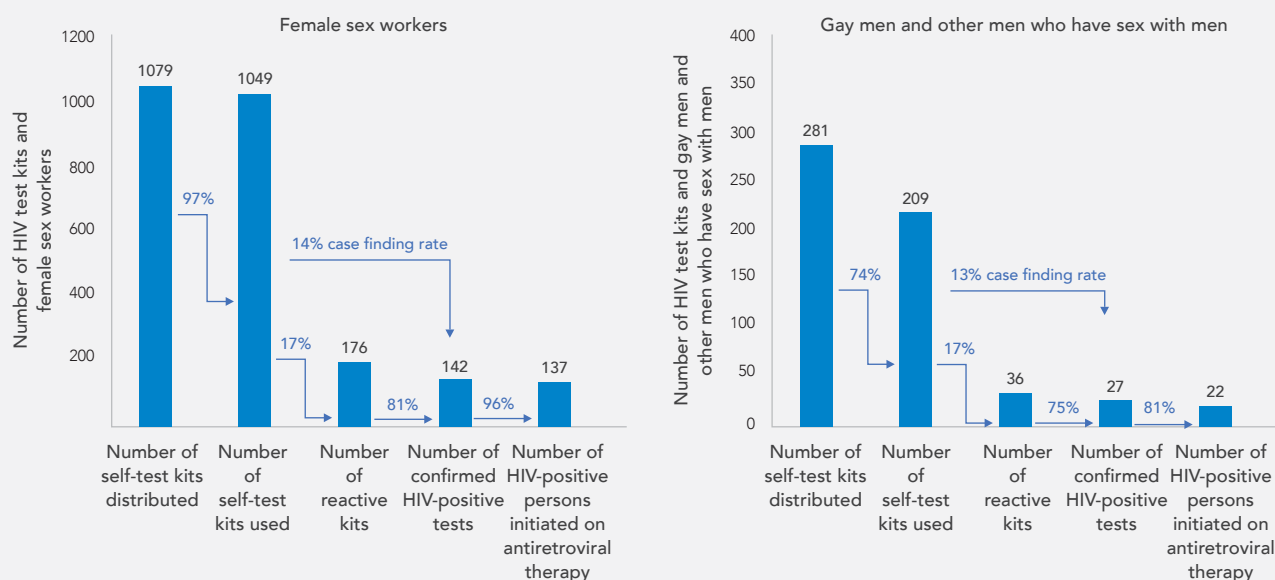
Number of people tested, number of HIV-positive tests and yield, various HIV testing modalities, LINKAGES project, Burundi, April–September 2018



Source: USAID, FHI360, PEPFAR. LINKAGES project, October 2018.

Figure 26. The self-testing-to-treatment cascade

Self-test kit distribution and use, and linkages to confirmatory testing and initiation of treatment, LINKAGES project, Burundi, April–September 2018



Source: USAID, FHI360, PEPFAR. LINKAGES project, October 2018.

IMPROVING VIRAL SUPPRESSION

Monitoring treatment

After a diagnosis and over the course of their lifelong treatment, people living with HIV require diagnostic tests to assess their immune status, check for opportunistic infections and ensure that their treatment is working towards viral suppression.

A CD4 cell count measurement at treatment initiation remains critical, as it provides information on the overall immune function of a person living with HIV, and it is the best predictor for disease status and immediate risk of death (52). CD4 count is also helpful for determining the immune status of people whose treatment is failing (as established by a viral load test) and guiding subsequent decisions on their clinical management (53). Viral load testing is far more sensitive than CD4 tests or clinical monitoring. Treatment nonadherence or treatment failure can be detected more quickly when viral load testing is conducted routinely. Viral load testing also gives clients a measure of understanding, control and motivation to adhere to treatment and understand their HIV infection (54). Viral load testing is a critical tool for tailoring care so that those with suppressed viral loads visit health facilities less frequently, allowing health-care providers to focus their attention on patients with unsuppressed viral loads. Where adherence problems are ruled out, or where viral loads are repeatedly high, patients should be switched to second-line and third-line treatment regimens (55).

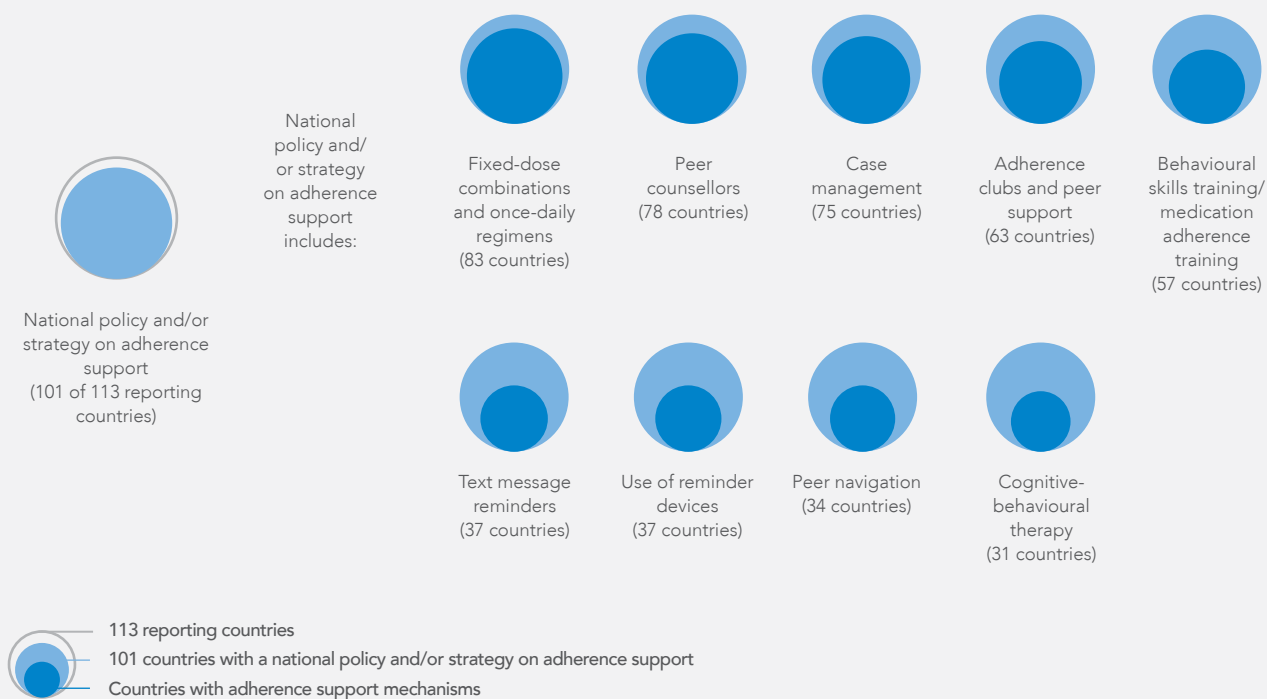
Viral load testing coverage is increasing, and in some high-prevalence countries, the pace of scale-up has been extraordinary. In Kenya, a national free-of-charge viral load testing programme was first established in 2012. It initially prioritized patients with suspected virologic failure, and routine testing of all patients was recommended in 2014. The programme includes an electronic data management system for patient monitoring, tracking scale-up and monitoring problem areas. The average number of viral load tests conducted per month increased from 1191 in 722 facilities in 2012 to more than 40 000 in about 2000 facilities by early 2016. The number of laboratories conducting testing increased from five in 2012 to nine by 2015. Lab turnaround times increased in 2014 as the programme was dramatically scaled up, but by 2016, the median time from sample collection to results dispatch from the laboratory had decreased to 21 days. (56).

An evaluation of Kenya's viral load testing scale-up found that viral load test processing turnaround times may be further decreased through review of laboratory workflow, identification of inefficiencies and introduction of point-of-care testing. The analysis also stressed the need for strong adherence counselling programmes and patient support programmes to reduce loss to follow-up, and for strong patient tracking and failure management programmes to ensure that viral load tests are used effectively and that patients are placed on the best possible treatment (56).

Adherence support

Country reporting to UNAIDS at the end 2017 showed that most countries have a policy or strategy in place to support people living with HIV to adhere to antiretroviral therapy, but in many countries, key components are missing (Figure 27).

Figure 27. National policies and strategies for adherence support, global, 2017



Source: 2017 National Commitments and Policy Instrument.



Point-of-care viral load testing

Similar to early infant diagnosis, transportable diagnostic machines can be used to test viral load at the point of care. The advantage of these point-of-care technologies, such as the GeneXpert platform, is they do not require the transport of specimens to a laboratory for analysis, and results can be obtained and shared with the patient much more quickly. Point-of-care viral load testing may be particularly useful for providing care for hard-to-reach populations, as the relative portability of the systems enables use in community outreach services, such as for people who inject drugs or rural populations. It reduces the number of times a stable patient must visit a health facility, which is more convenient for the patient and allows the health-care system to spend more time with patients who are struggling to suppress their viral loads. In addition, faster identification and management of virological failure in pregnant and breastfeeding women through point-of-care testing may contribute to prevention of mother-to-child transmission (57). The cost of point-of-care viral load testing remains high, and implementation research—coupled with cost-effectiveness studies—are needed to integrate the technology into differentiated care models in an efficient way (57, 58).

Multidisease approaches to care

Multidisease approaches are a more efficient use of health sector resources and a key component of universal health coverage, which aims to ensure that all people have access to the health services they need (prevention, promotion, treatment, rehabilitation and palliative care) without the risk of financial hardship when paying for them (59). HIV-related risk behaviour and the impact of HIV on the immune system puts people living with HIV at greater risk for a number of coinfections and opportunistic infections, including tuberculosis, viral hepatitis, severe bacterial infections, cryptococcal meningitis, toxoplasmosis, pneumonia and fungal infections. Multidisease approaches are an efficient way to respond to the health care needs of people living with HIV.

Developments in molecular technologies mean that it is increasingly possible to diagnose different diseases rapidly using single platforms. These offer technical and financial efficiencies for national health systems, while expanding access to care and saving lives. They can also help to overcome specific challenges in diagnosis and treatment, including early infant diagnosis of HIV and viral load monitoring for both HIV and hepatitis (60, 61). In the western Pacific, the United Nations Development Programme (UNDP) is supporting the introduction of new test that can detect HIV and syphilis infection from a simple finger prick that can be performed anywhere. Over 30 000 test kits have been supplied across 11 countries, and health-care workers have received training in how to use them effectively (62).

The integration of HIV and non-HIV health services can help normalize HIV testing (63). Where primary health care is generally limited, “one-stop shop” multidisease services can encourage routine HIV testing as just another part of a health check-up, or they can

be provided alongside of care for acute illnesses (such as malaria). Multidisease services can also increase the efficiency of primary health care provision, as they reduce the need for a multiplication of staff, infrastructure and other resources.

Multidisease services can also overcome a number of barriers to HIV service uptake, such as stigma and discrimination. There is evidence that clients prefer integrated services not only because they save time and money in accessing care, but also because clients trust that their HIV status will be kept confidential and because visiting an integrated service facility may make it harder for others to guess their status (64, 65).

Getting more out of point-of-care diagnostic platforms

Fully automated multidisease testing platforms can be used at lower levels of health systems thanks to minimal biosafety and training requirements (61). With support from CHAI and UNICEF, the Ministries of Health in Malawi and Zimbabwe determined that at least 50% of existing multidisease testing devices had sufficient excess capacity to offer integrated tuberculosis–HIV testing (66). Pilots in both countries enabled increased use of these instruments without compromising tuberculosis services, while also improving turnaround time of early infant diagnosis. In Malawi, where 75 of the 90 devices dedicated to tuberculosis testing had sufficient capacity to handle viral load and early infant diagnosis testing, the time between sample collection and receipt of result was reduced from a median of 20 days using the centralized system to just three days (66, 67). In Zimbabwe, integrated testing increased the utilization rate of existing multidisease testing devices from 38% to 63%, and 78% of patients with elevated viral load received a clinical response to support resuppression within a week (compared to less than 5% when using centralized testing) (67). Turnaround times to receipt of result in Zimbabwe were reduced from a median of 14 days to one day, while the turnaround time between sample collection and treatment initiation for infants living with HIV was reduced from a median of 41 days to two days (66).

Integrating testing services offers significant potential cost savings. According to a CHAI analysis, a country hypothetically adding tests from another disease programme on 200 multidisease testing devices used by the tuberculosis programme would result in a total savings of US\$ 8.75 million over five years (compared to operating separate programmes of the same size). If all of the ongoing costs of equipment, service and maintenance, connectivity, human resources, and mentoring and supervision for laboratory technicians were split evenly between single-disease programmes, the tuberculosis programme would realize savings of US\$ 2.61 million, and the other programme would achieve savings of US\$ 2.13 million (68).

Integrating tuberculosis and HIV services

There are particularly strong advantages to integrating tuberculosis and HIV services. People with presumptive or diagnosed tuberculosis should be routinely tested for HIV, as should their partners and family members, and screening for tuberculosis is an essential component of the HIV care package for people living with HIV (69, 70). HIV and tuberculosis control programmes should either devise a joint tuberculosis–HIV plan or introduce tuberculosis–HIV components in their disease-specific plans, and integrated tuberculosis–HIV services should be delivered at the same time and location (70). HIV and tuberculosis control programmes should also collaborate with other programmes to ensure access to integrated and quality-assured services for women, children, prisoners and people who use drugs (70). The roll-out of digital X-ray and multidisease testing devices—and the strategic placement of rapid tuberculosis diagnostic tools within HIV

health facilities—can also contribute to reducing delays in diagnosis and treatment access (71).

Evidence from India shows the value of colocating tuberculosis and HIV services. In the states with higher proportions of colocated facilities in 2013, more than 90% of tuberculosis patients knew their HIV status, while in the states with lower coverage, only about 50% of tuberculosis patients knew their HIV status (72).

A RIGHTS-BASED APPROACH

Seven key programmes

UNAIDS has identified seven key programmes for every HIV response that can help to ensure that the rights of people at risk of HIV infection and people living with HIV are protected:

1. Reducing stigma and discrimination.
2. Increasing HIV-related legal services.
3. Monitoring and reforming laws, regulations and policies relating to HIV.
4. Legal literacy or “know your rights.”
5. Sensitizing lawmakers and law-enforcement agents.
6. Training health-care providers on human rights and medical ethics related to HIV.
7. Reducing discrimination against women in the context of HIV (73).

Reducing stigma and discrimination improves access to and uptake of HIV services. Addressing community-level stigma can potentially increase women’s uptake of testing, targeted education programmes (combined with increased availability of treatment) can decrease stigma against people living with HIV and increase testing rates, and using popular opinion leaders to disseminate stigma reduction messages among health-care providers can reduce prejudicial attitudes towards (and avoidance of) people living with HIV (74–76).

Reforming or removing discriminatory and punitive laws while building legal protections empowers individuals and communities. Decriminalizing same-sex sexual conduct and other sexual behaviours between consenting adults, adult consensual sex work, drug use or possession of drugs for personal use improves health-seeking behaviour among members of key populations: it reduces stigma (both internal and external), reduces fear and increases their ability to report discrimination (including from health-care workers) (77, 78). Removing parental consent laws improves access to HIV testing and other sexual and reproductive health and HIV services among children, adolescents and young people.

The rights of people living with HIV and those at risk of HIV infection must also be actively protected in order to create an environment in which they feel safe and are genuinely able to access HIV testing and other services. Laws must be enacted that prohibit discrimination on the basis of HIV status, sexual orientation and gender identity in health-care settings and elsewhere, and employment status (such as sex work). Laws guaranteeing health services to all (including people who use drugs), protecting the confidentiality of personal information (including for criminalized populations) and supporting the right to consent to treatment are also necessary.

People in prisons, for example, should enjoy the same standards of health care that are available in the community and should have access to health-care services without discrimination on the grounds of their legal status. Health-care services in prisons should be organized in close relationship to the general public health administration and in a way that ensures continuity of treatment and care for HIV, tuberculosis and other infectious diseases (79). Law and policy change must be bolstered by legal and practical measures to ensure accountability and access to legal services for people living with HIV and members of key populations who suffer discrimination (38).

In the United States, after New Jersey state law was changed to remove requirements for parental consent to HIV testing, there was a substantial increase in the uptake of HIV testing and counselling services (80). Under South African law, children aged 12 years or older can get tested without parental or guardian consent, as can those under the age of 12 who are of sufficient maturity to understand the benefits, risks and social implications of such a test (81). As of 2012, guidelines have been available to enable implementers to navigate the ethical issues relating to testing children with their consent (82).

Following the introduction of the 2012 Gender Identity Law in Argentina, reports of discrimination in health care based on gender identity were halved, and transgender women and men now have better and earlier access to health services, including HIV testing and treatment (83). In India, the Supreme Court ruled in 2016 that transgender women and men have the right to self-identify as male, female or third gender, and that the Indian Government had an obligation to ensure their fundamental rights without discrimination. India's Parliament passed the HIV and AIDS (Prevention and Control) Act the following year, which explicitly calls for people living with or affected by HIV to have equal access to education, housing and employment, and includes a national process for handling HIV-related complaints (84, 85). In September 2018, India's Supreme Court unanimously overturned a colonial-era law that criminalizes consensual same-sex sexual activity, ruling that discrimination on the basis of sexual orientation is a fundamental violation of rights (86).

The law can also play an important role in protecting the right to be free from coerced or mandatory testing and to ensure testing is only done on the basis of voluntary informed consent. For example, the 2017 HIV and AIDS (Prevention and Control) Act in India requires informed consent for HIV testing, treatment and status disclosure (84).

Building trust through people-centred services

Health care systems play a vital role in a human rights-based approach to HIV through the delivery of people-centred, confidential services that build trust between health-care workers and beneficiaries (87). People-centred health care requires ongoing consultation with beneficiaries to ensure that their needs are understood and actually met, and to improve their overall engagement with health services (88). For people living with HIV and key populations, people-centred health care can include adapting opening hours to suit clients, such as providing late or night hours for sex workers (88). For adolescents, it might involve expanding clinic hours to include after-school periods and weekends, or introducing youth-friendly health services and providing training to health-care providers on adolescent development to ensure they are equipped to engage positively with this group (24).

Training and information for health-care workers on HIV, discrimination and related rights is another effective way of reducing stigma, discrimination and exclusion in health-care settings. This can be provided as part of education for medical and other health-care students, and as part of ongoing professional development (76, 89–92).



**WHEN YOU
TEST HIV
POSITIVE,
START
TREATMENT
IMMEDIATELY**



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