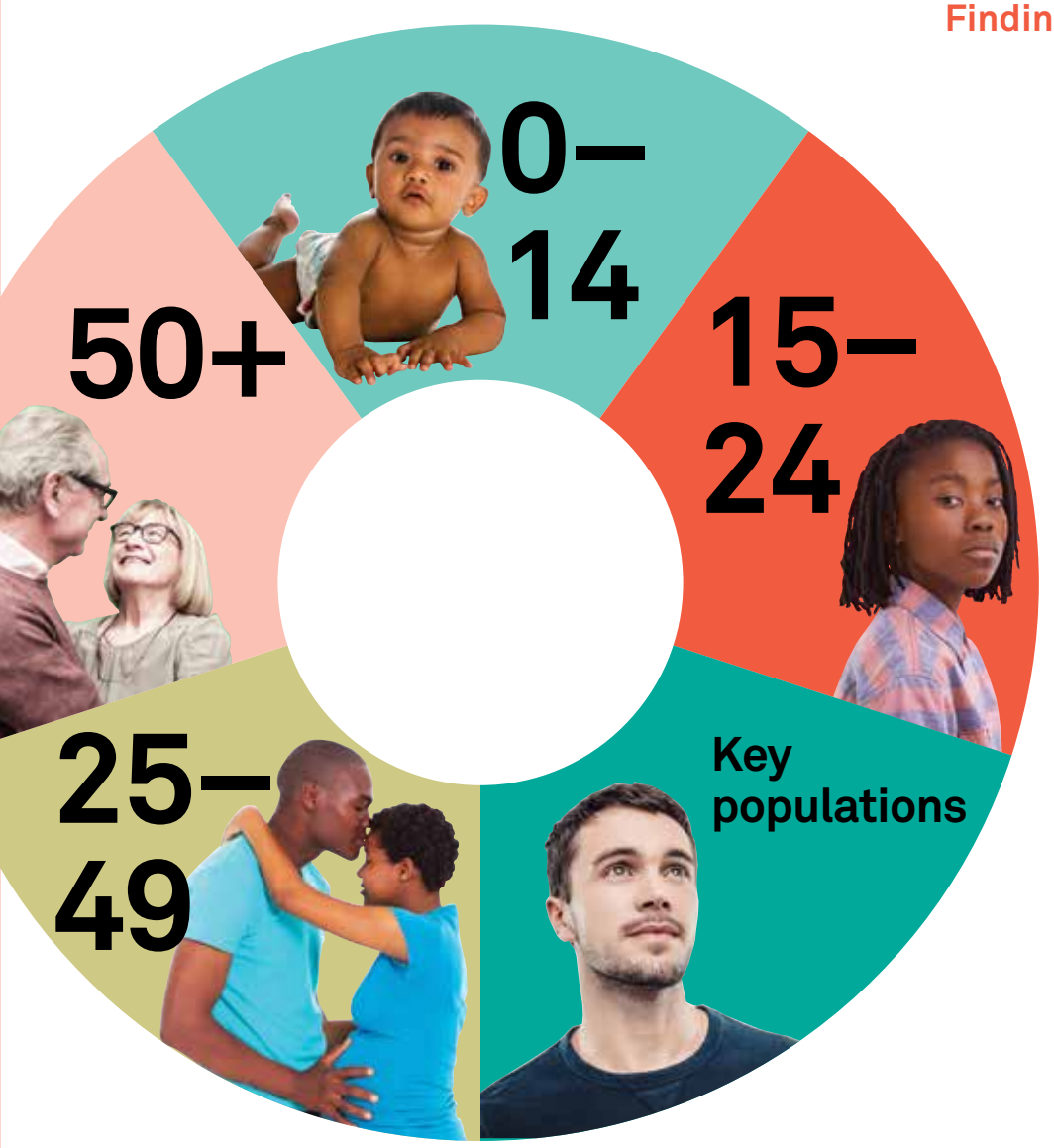
Get on the Fast-Track

The life-cycle approach to HIV

Finding solutions for everyone at every stage of life



UNAIDS | 2016

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foreword

The scope of HIV prevention and treatment options has never been wider than it is today. The world now has the scientific knowledge and experience to reach people with HIV options tailored to their lives in the communities in which they live.

This life-cycle approach to HIV ensures that we find the best solutions for people throughout their lifetime.

And it begins with giving children a healthy start in life free from HIV. The progress made in reducing mother-to-child transmission of HIV is one of the remarkable success stories in global health. Antiretroviral medicines have averted 1.6 million new HIV infections among children since 2000. Even so, intensified efforts are needed to virtually eliminate transmission from mother to child.

Adolescence is a turbulent time, and a particularly dangerous time for young women living in sub-Saharan Africa. As they transition to adulthood, their risk of becoming infected with HIV increases dramatically. When women and girls are empowered, they have the means to protect themselves from becoming infected with HIV and to access HIV services.

No one should be left behind through the life-cycle approach. Key populations, such as sex workers, people who inject drugs and men who have sex with men, prisoners and migrants, need access to the HIV treatment and prevention options that best meet their needs.

In this report, UNAIDS is announcing that 18.2 million people now have access to HIV treatment. The Fast-Track response is working. Increasing treatment coverage is reducing AIDS-related deaths among adults and children. But the life-cycle approach has to include more than just treatment. Tuberculosis (TB) remains among the commonest causes of illness and death among people living with HIV of all ages, causing about one third of AIDS-related deaths in 2015. These deaths could and should have been prevented.

TB, like cervical cancer, hepatitis C and other major causes of illness and death among people living with HIV, is not always detected in HIV services. It is vital that we collaborate closely with other health programmes to prevent unnecessary deaths.

The impact of better treatment coverage means that a growing number of people will be living with HIV into old age, while there has also been an increase in new HIV infections among older people. The consequences of long-term antiretroviral therapy, combined with the diseases of ageing, will be new territory for many HIV programmes.

Drug resistance is a major threat to the AIDS response, not just for antiretroviral medicines but also for the antibiotic and antituberculous medicines that people living with HIV frequently need to remain healthy. More people than ever before are in need of second- and third-line medicines for HIV and TB. The human burden of drug resistance is already unacceptable; the financial costs will soon be unsustainable. We need to make sure the medicines we have today are put to best use, and accelerate and expand the search for new treatments, diagnostics, vaccines and an HIV cure.

As we build on science and innovation we will need fresh thinking to get us over the remaining obstacles. The cliché is true—what got us here, won't get us there. We face persistent inequalities, the threat of fewer resources and a growing conspiracy of complacency.

Coming from Africa, I am proud that low- and middle-income countries are responsible for more than half of the HIV resources available. Coupled with a successful replenishment of the Global Fund to Fight AIDS, Tuberculosis and Malaria and a resilient bi-partisan United States President's Emergency Plan for AIDS Relief, our push for shared responsibility and global solidarity is working.

However, resources will continue to be scarce and the need to show a return on investment will be stronger than ever before. And with no reduction in the global number of new HIV infections among adults in the past five years, and rising numbers of new infections in some regions of the world, we need to realize that if there is a resurgence in new HIV infections now, the epidemic will become impossible to control.

On this World AIDS Day, I call on world leaders, partners, activists, communities and people living with HIV to get on the Fast-Track to end this epidemic.

AIDS is not over, but it can be.

Michel Sidibé
UNAIDS Executive Director

introduction

The life cycle can be used as a lens to better understand the complex dynamics of the HIV epidemic and the response.

The human life cycle is an individual journey of change. During infancy, childhood, adulthood and advanced age, we are faced with different sets of risks and opportunities. As we age, our roles change within families and communities.

The dynamics of the life cycle have been adopted by the business world to guide the development and improvement of products and services, and to explain the growth and decline of enterprises. The life cycle can also be used as a lens to better understand the complex dynamics of the HIV epidemic and the response. Innovations in data collection reveal how the risks of infection, the challenges of accessing services and the solutions to these challenges change at different stages of life.

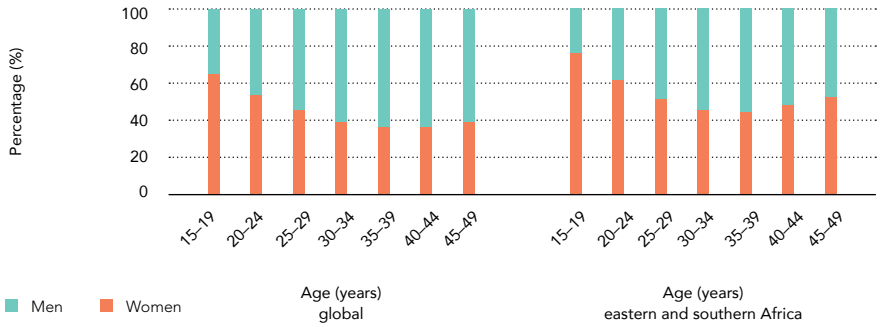
The infection risks faced by the unborn child of a mother living with HIV are minimized when readily available diagnostics and antiretroviral medicines are used in a timely manner. Expectant mothers need good-quality antenatal care that routinely offers HIV testing. Pregnant women found to be living with HIV require immediate antiretroviral therapy, and support to adhere to their treatment throughout pregnancy, breastfeeding and the rest of their lives. Newborn children and their mothers require linked postnatal care that includes early virological testing for the babies and paediatric treatment to the few who acquire HIV.

As children go through adolescence, new challenges emerge. HIV risks among young people are higher when they come of age within challenging environments, with insufficient access to food, education and housing, and high rates of violence. Perceptions of low infection risk, insufficient condom use and low rates of HIV testing persist among young people. The transition from childhood to adulthood is also a dangerous time for adolescents living with HIV. Treatment adherence is low and treatment failure is high among adolescents living with HIV. A three-fold increase in children living with HIV growing to adolescence within the past 10 years has magnified this challenge within the treatment programmes of dozens of countries.

During adolescence, HIV risk is considerably higher among girls, especially in high-prevalence settings such as eastern and southern Africa. Social protection measures and keeping adolescents in school reduce HIV risks. Schools are also the most convenient vehicle for comprehensive sexuality education, which provides adolescents and young people with the knowledge and skills necessary to make conscious, healthy and respectful choices about relationships and sexuality. The HIV-related effects of these measures are linked closely to the empowerment of adolescent girls and young women that comes with an education and economic independence.

As life progresses into adulthood, the proportion of people newly infected with HIV globally who are men grows steadily, from 35% of people aged 15–19 years to 63% of people aged 40–44 years.[1] Even in eastern and southern Africa, where predominantly male key populations account for a much smaller proportion of new infections than the global average, 54% of new HIV infections among people aged 30–34 years in 2015 were men.

Proportion of new HIV infections by sex, global and eastern and southern Africa, 2015



Source: UNAIDS 2016 estimates.

New phylogenetic data from South Africa reveal a vicious cycle of HIV infection among older and younger people that may be at play in many high-prevalence settings: young women are acquiring HIV from adult men—as these young women grow older, they tend to transmit HIV to adult men, and the cycle repeats. Data from other studies suggest that gender inequalities and harmful masculinities underpin this cycle. Lower access to education, lower levels of economic independence and intimate partner violence erode the ability of young women to negotiate safer sex and retain control of their bodies. Men, meanwhile, tend to be ignored by health policies and HIV strategies, they seek services infrequently, and they tend to be diagnosed with HIV and initiate treatment very late—often with deadly consequences.

Efforts to reduce new HIV infections among adults have stalled, threatening future progress towards the end of AIDS.

Leveraging the life-cycle approach to kickstart HIV prevention

The insights revealed by the life-cycle approach must be leveraged to address one of the greatest challenges facing the global AIDS response: stalled progress on HIV prevention among adults. New infections among young women aged 15–24 years have declined by only 6% between 2010 and 2015, while the rate of new HIV infections among 25–49-year-old men and women is essentially flat. Meanwhile, new infections appear to be rising among people who inject drugs and men who have sex with men.

UNAIDS warned in July 2016 that this prevention gap is a threat to future progress towards the end of AIDS. The *Prevention gap report*[2] shows how some countries have achieved decline in new HIV infections among adults of 50% or more over the last 10 years, while many others have not made measurable progress or experienced worrying increases in new HIV infections.

[1] All data in the text of the report without endnote references are from UNAIDS 2016 estimates or 2016 Global AIDS Response Progress Reporting. National estimates and programme data submitted by countries to UNAIDS are available on the AIDSinfo website (aidsinfo.unaids.org).

Measures to close this gap are readily available. A combination of HIV risk awareness, economic empowerment and oral pre-exposure prophylaxis (PrEP) is a potentially powerful HIV prevention method for young women living in within extremely challenging economic and social circumstances. Social protection measures such as cash transfers and free education have been shown to dramatically reduce economically driven sex among 12–18-year-old girls. Assisted partner notification and self-test kits have been shown increase access to HIV testing among men. Cities and countries that have put in place truly comprehensive HIV programmes tailored to the needs of key populations have successfully reduced new HIV infections among sex workers, people who inject drugs and men who have sex with men. These evidence-informed, high-impact approaches must be consistently applied across the life cycle, using a location–population approach that prioritizes the geographical areas and populations in greatest need.

Building on a strong global foundation

Redoubled efforts to close the prevention gap can be built on a foundation of unparalleled global advocacy and financial commitment. Strategic global partnerships have already put the elimination of mother-to-child transmission within sight. Twenty-one countries in Africa have worked with UNAIDS and the United States President's Emergency Plan for AIDS Relief (PEPFAR) to reduce new infections among children aged 0–14 years by 51% since 2010. Further efforts focused on children, adolescent girls and young women are being guided by a new framework: *Start Free Stay Free AIDS Free*. Governments and civil society are also working with the United Nations system within the High-Level Task Force on Women, Girls, Gender Equality and HIV in Eastern and Southern Africa to raise greater awareness of the disproportionate HIV risks faced by adolescent girls and young women. The 90–90–90 targets,[3] launched by UNAIDS at the 2014 International AIDS Conference, has rallied global efforts on HIV testing and treatment, and improved focus on the viral suppression required to realize the full preventative effect of treatment.

Antiretroviral therapy is now accessed by 18.2 million [16.1 million–18.8 million] people living with HIV, and AIDS-related deaths have plummeted by 45% since 2005.

Antiretroviral therapy is now accessed by 18.2 million [16.1 million–19.0 million] people living with HIV. Consistently strong scale-up of treatment has seen AIDS-related deaths plummet by 45%, from a peak of 2 million [1.7 million–2.3 million] in 2005 to 1.1 million [940 000–1.3 million] in 2015. More and more adults living with HIV are over the age of 50 years. Age-related diseases such as cardiovascular disease are more common among people living with HIV, and antiretroviral drug resistance poses a significant threat to people who have been living with HIV for many years. Mounting cases of drug-resistant tuberculosis (TB) are threatening to slow steady reductions in deaths among people living with HIV caused by TB disease. Women living with HIV remain at heightened risk of developing cervical cancer due to insufficient coverage of human papillomavirus immunization programmes in

[2] http://www.unaids.org/en/resources/documents/2016/prevention-gap

[3] By 2020, 90% of people living with HIV know their HIV status, 90% of people who know their HIV-positive status are accessing treatment, and 90% of people on treatment have suppressed viral loads.

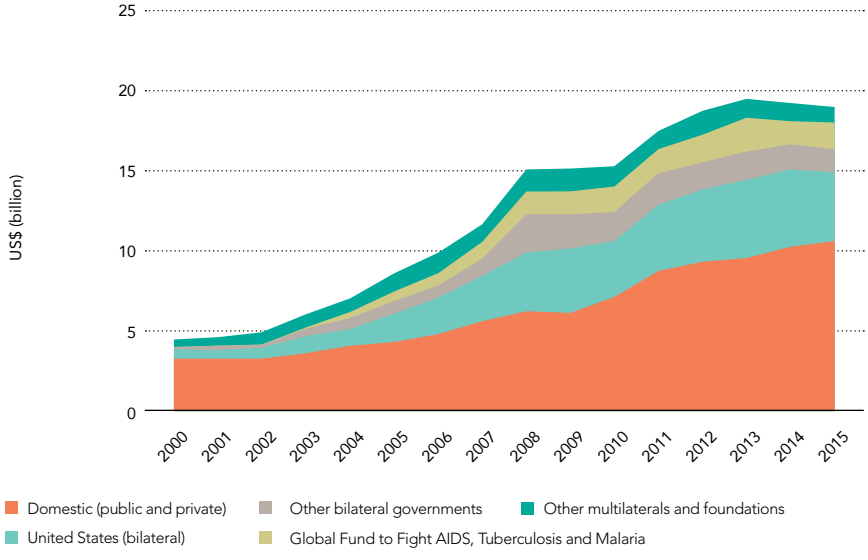
low- and middle-income countries, and an estimated 10 million people who inject drugs have hepatitis C infection. Achieving the 2020 target of fewer than 500 000 AIDS-related deaths annually will require taking AIDS out of isolation through people-centred systems for universal health coverage, including treatment for TB, cervical cancer and hepatitis B and C.

Low- and middle-income countries investing in the end of AIDS

Ten years ago, the acceleration of the AIDS response was largely dependent on bilateral and multilateral donors. At the United Nations General Assembly in 2011, UNAIDS called for shared responsibility, broader ownership and wider accountability to meet the investment needs of the response in a sustainable manner *(1)*. Low- and middle-income countries have answered this challenge. In the past five years, domestic investment in the AIDS responses of these countries has increased by 46%, reaching US$ 10.8 billion in 2015. Total annual investment in these countries reached US$ 19.0 billion, including the contributions of PEPFAR, the Global Fund to Fight AIDS, Tuberculosis and Malaria, and other bilateral and multilateral donors.

Low- and middle-income countries have answered UNAIDS' call for shared responsibility. In the past five years, domestic investment in the AIDS responses of these countries has increased by 46%, reaching US$ 10.8 billion in 2015.

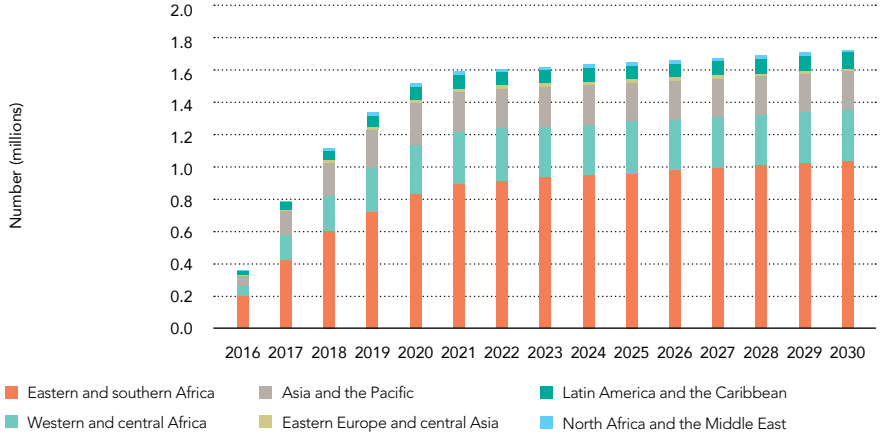
Investments in the AIDS responses of low- and middle-income countries, by source of funding, 2000–2015



Source: UNAIDS estimates, June 2016 - UNAIDS-Kaiser Family Foundation. Financing the response to AIDS in low- and middle-income countries till 2015 - OECD CRS last accessed June 2016.

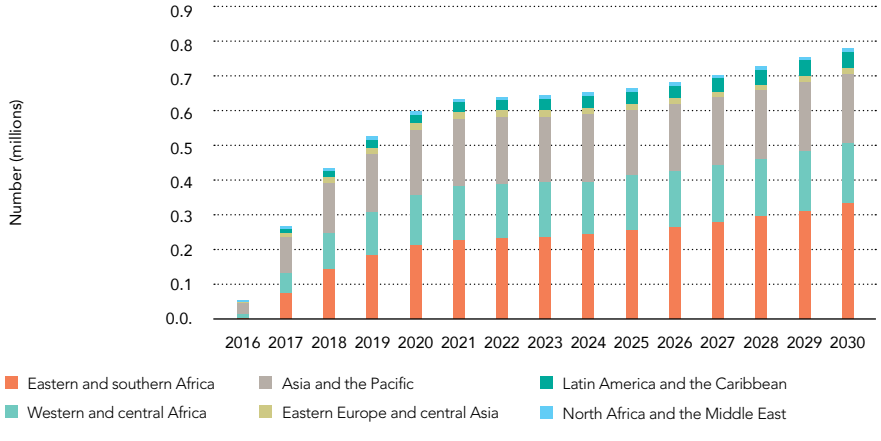
A sizable investment gap remains, however. Reaching the Fast-Track Targets agreed by the United Nations General Assembly will require an additional US$ 7 billion annually by 2020. Reaching and sustaining this level of investment until 2030, and focusing these resources on delivering the most effective HIV services to the people in greatest need across the life cycle, will result in millions of additional lives saved and tens of millions of additional HIV infections averted.[4]

Additional HIV infections averted through a Fast-Track response, compared to 2015 levels of coverage, 2016–2030



Source: Lamontagne E, Over M, Stover J et al. The economic returns of ending the AIDS epidemic by 2030. 2016, in press.

Additional AIDS-related deaths averted through a Fast-Track response, compared to 2015 levels of coverage, 2016–2030



Source: Lamontagne E, Over M, Stover J et al. The economic returns of ending the AIDS epidemic by 2030. 2016, in press.

[4] Compared with 2015 levels of coverage.

Validation of UNAIDS treatment data

UNAIDS/WHO estimates of the number of people who were accessing antiretroviral therapy at the end of June 2016 were based on new treatment data submitted by 124 countries and estimates for 50 countries using data previously reported to UNAIDS/WHO or other published data. Together these 174 countries include 98% of the world's population. Validation activities for the number of people on antiretroviral therapy have included comparisons with a number of independent data sources, including WHO, PEPFAR, the Global Fund, antiretroviral drug procurement and patient tracking data from selected countries, Indian generic manufacturer transaction data, selected countries' data quality assessments and national population-based surveys that included measurement of antiretroviral medicines in the blood samples of survey participants.

The analysis of generic manufacturers' export data suggested that a quantity of antiretroviral drugs to treat 13.7 million–15.7 million people was procured in 2015, compared to the reported 13.9 million people on antiretroviral therapy in generic-accessible low- and middle-income countries. Additional triangulation for high-burden countries validated the numbers of people on treatment for the majority of countries where alternative data sources were available. In some countries, the quality of the data available at health facilities and reported to the national health information system, although improving over time, was of concern. Because of the uncertainty in data quality in some countries, the estimated numbers of people on antiretroviral therapy presented in this report are accompanied by ranges representing this uncertainty. UNAIDS, WHO and other partners continue to support countries to improve the accuracy of the numbers of peopl\e reported to be on treatment.

A detailed description of UNAIDS methods for estimating mid-2016 antiretroviral therapy numbers is included in an annex to this report.

References

1. Panel 1: shared responsibility—a new global compact for HIV. New York: United Nations General Assembly; 2011 (http://www.unaids.org/en/media/unaids/contentassets/documents/document/2011/06/20110601_HLM_Pannel1.pdf).

Finding solutions for everyone at every stage of life

0–14

children (0–14)

Progress and gaps

In June 2011 UNAIDS and the United States President's Emergency Plan for AIDS Relief (PEPFAR) launched the *Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive* (Global Plan) along with 22 countries that at the time accounted for 90% of the global number of pregnant women living with HIV.

The number of children aged 0–14 years on antiretroviral therapy globally has doubled over the past five years, reducing AIDS-related deaths among children by 44%.

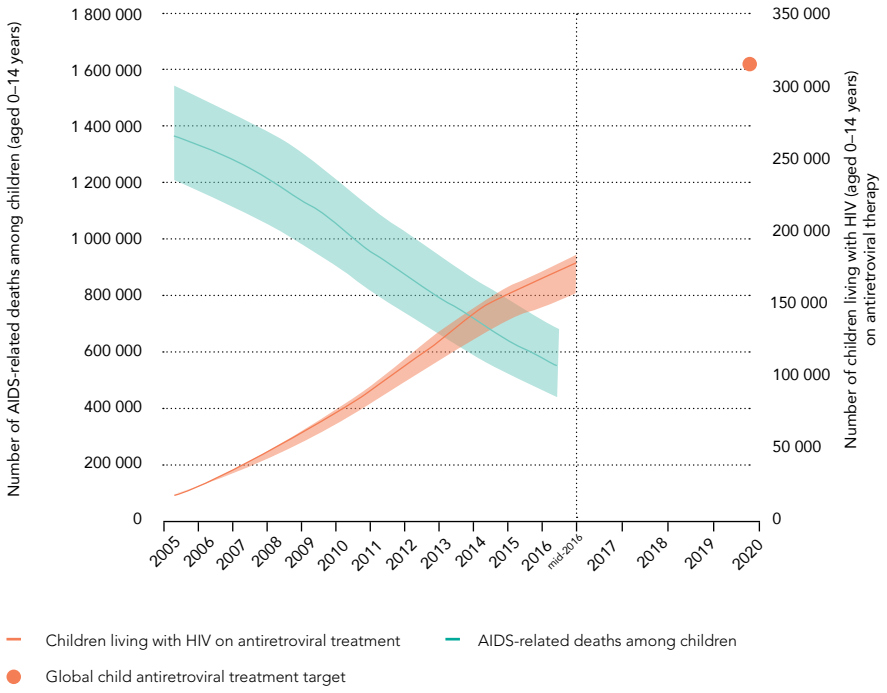
The Global Plan galvanized global and national political will and action. Global coverage of services to prevent mother-to-child transmission of HIV increased dramatically, from 50% [44-56%] in 2010 to 77% [69-86%] in 2015. As a result, the number of new HIV infections among children aged 0–14 years has declined by 51% since 2010. In addition, the number of children aged 0–14 years on antiretroviral therapy globally has doubled over the past five years, from nearly 452 000 children in 2010 to 910 000 [801 000–947 000] children by mid-2016, pushing down the number of AIDS-related deaths among children by 44%.

New HIV infections among children (aged 0–14 years) and percentage of pregnant women living with HIV receiving antiretroviral medicine (either prophylaxis or lifelong therapy) to prevent mother-to-child transmission, global, 2005–2015

Source: UNAIDS 2016 estimates.

Note: In 2010, single-dose nevirapine was no longer included in ARV coverage as an effective regimen for the prevention of mother-to-child transmission.

Children (aged 0–14 years) living with HIV on antiretroviral therapy and number of AIDS-related deaths among children, global, 2005–July 2016



Source: 2016 Global AIDS Response Progress Reporting; UNAIDS 2016 estimates.

Efforts to move forward are being guided by a new global framework: *Start Free Stay Free AIDS Free (1)*. Co-chaired by UNAIDS and PEPFAR, the framework aims to end AIDS in children, adolescents and young people by 2020 by building on key lessons learned from the Global Plan: the critical role of country ownership; putting women, especially women living with HIV, at the centre of policy discourse; strong monitoring and evaluation; and good coordination and strong technical assistance. The *Start Free* and *AIDS Free* components are focused on achieving the 2018 targets for children agreed by the United Nations General Assembly:

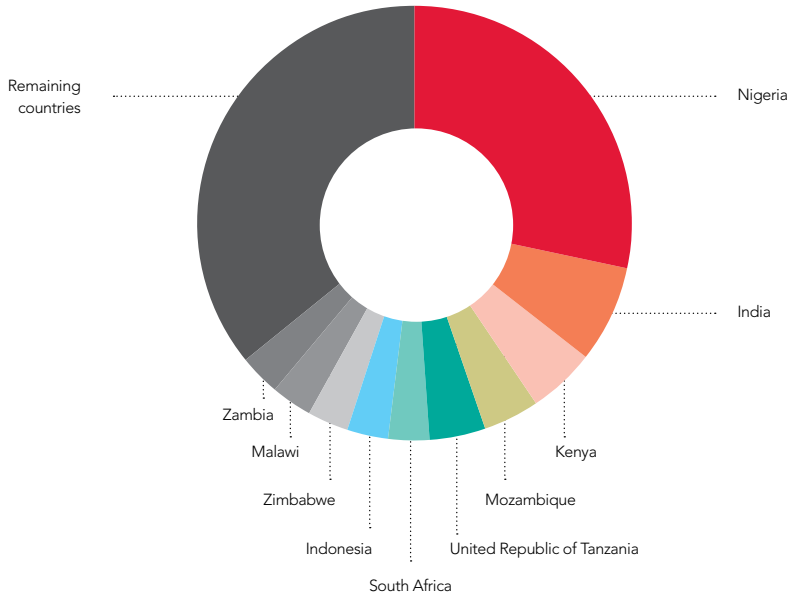
- Reduce the number of children newly infected annually to less than 40 000 by 2018.
- Reach and sustain 95% of pregnant women living with HIV with lifelong HIV treatment by 2018.
- Provide 1.6 million children aged 0–14 years and 1.2 million adolescents aged 15–19 years living with HIV with lifelong antiretroviral therapy by 2018 [Reach 95% of all children living with HIV].

The world is nearly on track to reach the targets to reduce mother-to-child transmission; however, the current rate of scale-up of paediatric treatment appears insufficient. Closing the gap will require a tremendous additional effort to diagnose infants living with HIV and enrol them in treatment as soon as possible.

Country status

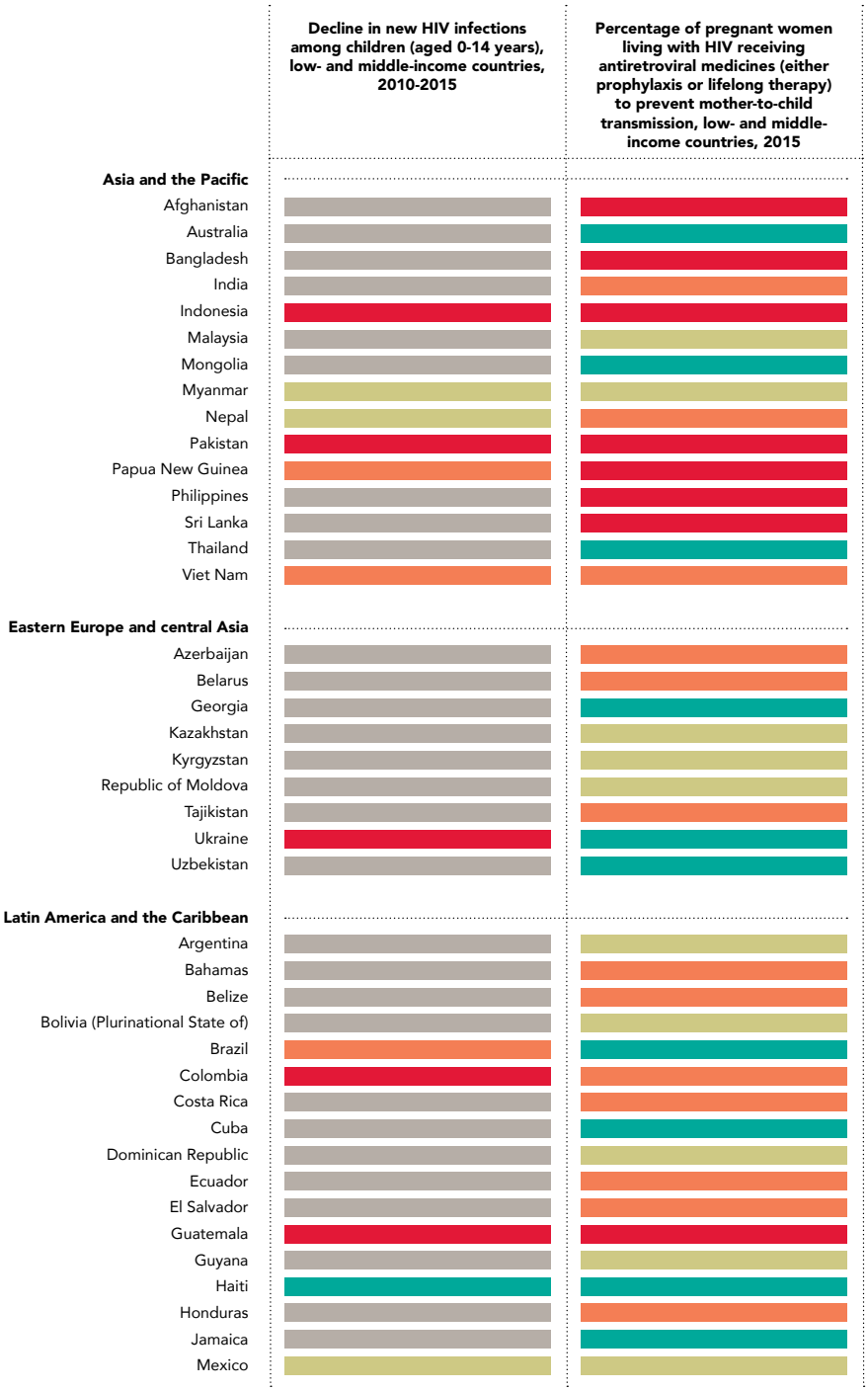
Progress towards the elimination of new HIV infections among children has been made across all regions, and in particular in eastern and southern Africa, which achieved a 66% reduction in vertical transmission between 2010 and 2015 *(2)*. However, coverage of services varies greatly among countries within regions. Of great concern are nine countries with large numbers of pregnant women living with HIV unable to access antiretroviral medicines, and particularly Nigeria, which alone accounted for more than a quarter of new HIV infections among children in 2015.

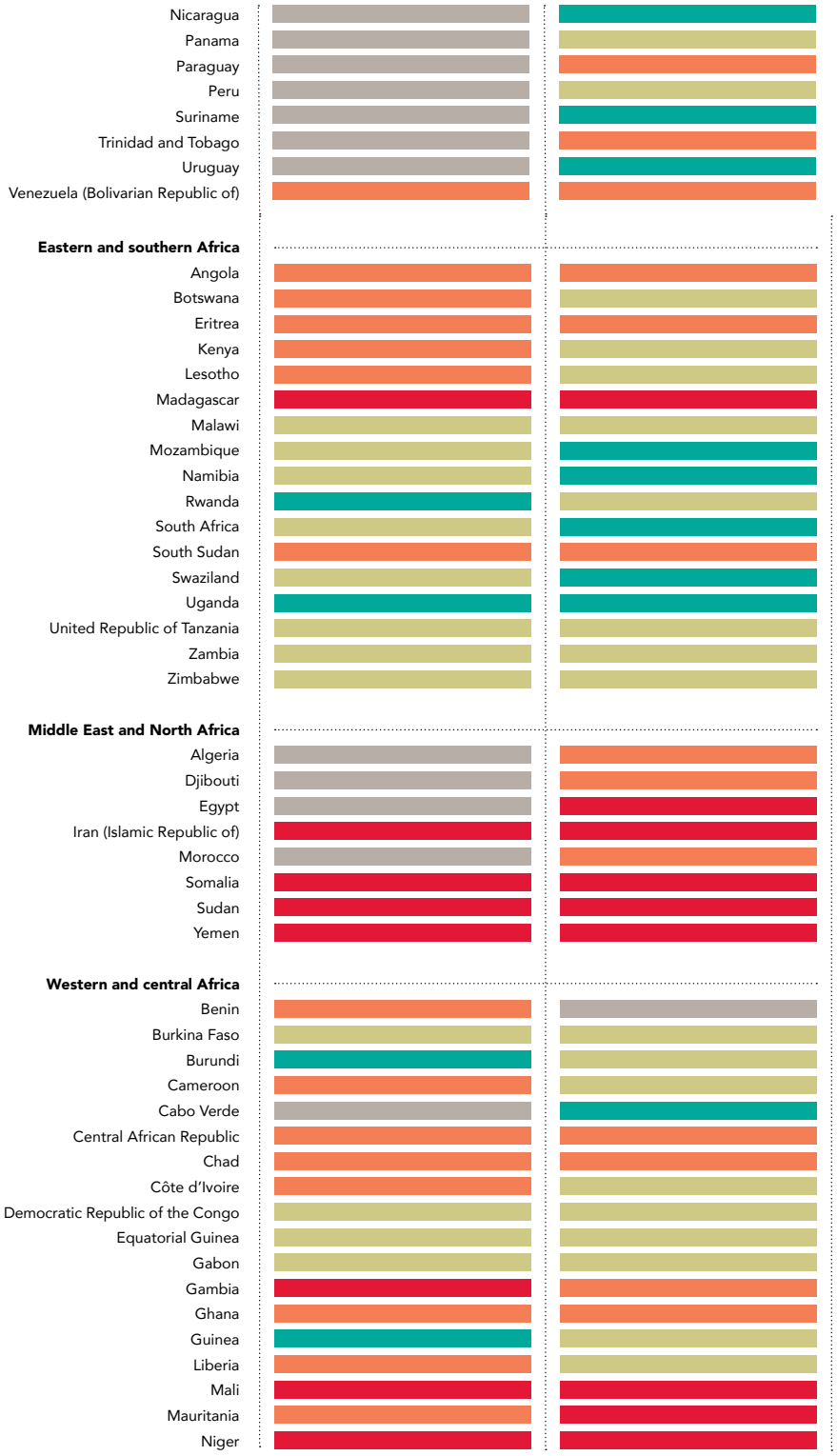
Distribution of new HIV infections among children (aged 0–14 years), global, 2015



Source: UNAIDS 2016 estimates.

Progress toward the elimination of HIV infections among children (aged 0–14 years), by country, 2015

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Trinidad and Tobago
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Lesotho
Madagascar
Malawi
Mozambique
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South Africa
South Sudan
Swaziland
Uganda
United Republic of Tanzania
Zambia
Zimbabwe
Middle East and North Africa
Algeria
Djibouti
Egypt
Iran (Islamic Republic of)
Morocco
Somalia
Sudan
Yemen
Western and central Africa
Benin
Burkina Faso
Burundi
Cameroon
Cabo Verde
Central African Republic
Chad
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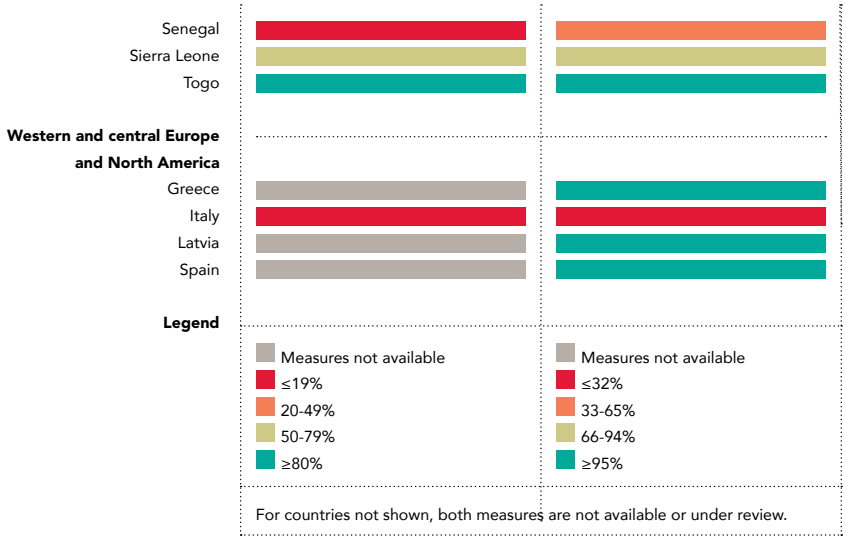


Key challenges

HIV testing among pregnant women

Routinely offering HIV tests to pregnant women during their first antenatal visit and retesting them in the third trimester and during breastfeeding is the gold standard in high-incidence settings *(3)*. In some countries, however, inadequate health-care infrastructure, poor linkages between HIV and maternal and child health services, and lack of awareness of the importance of routinely offering HIV testing prevent many women living with HIV from being reached.

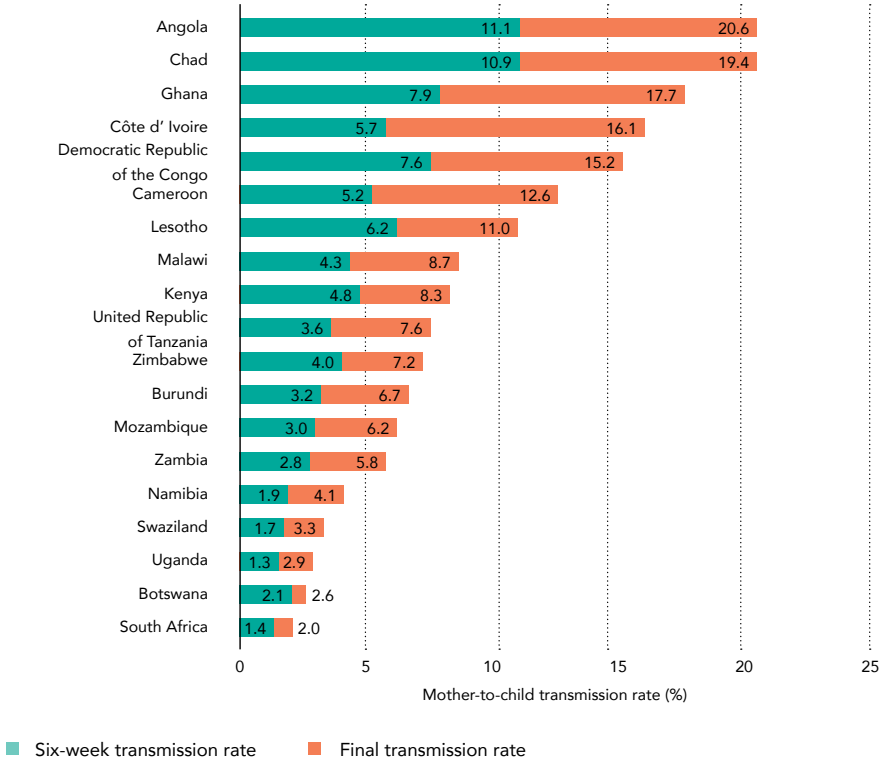
Countries with low HIV testing coverage among pregnant women have many challenges in common, such as a lack of test kits due to poor procurement and supply chain systems. In addition, traditional beliefs, cultural practices, stigma and discrimination, lack of confidentiality within health-care settings and transportation challenges hinder access and contribute to underutilization of services. In the United Republic of Tanzania, for example, a study found that concerns about confidentiality of testing and test results, quality of HIV counselling and testing services, and practical considerations such as accessibility and availability of ancillary services all had an impact on the uptake of HIV testing services for pregnant women *(4)*.

Mother-to-child transmission during breastfeeding

Many country programmes have emphasized the importance of providing antiretroviral medicines during pregnancy and delivery but some do not take sufficient steps to ensure that new mothers living with HIV are supported to adhere

to their treatment in the months after giving birth. HIV-negative new mothers at high-risk of HIV are also insufficiently tested while they are breastfeeding. As a result, infants are exposed unknowingly to HIV during breastfeeding, with half of all mother-to-child HIV transmissions occurring during this period. Many women living with HIV are not aware that they need to remain on treatment while breastfeeding their infants, and opportunities to reinforce the adherence messages and resupply women with medication are fewer once the baby is born, as women reduce their contact with the health system. Even when the baby is immunized, it may not be the mother who makes the visit to the clinic, relying instead on an older sibling or a grandparent while the mother works. Side-effects from antiretroviral therapy and personal perception of wellness can also lead mothers to stop taking their medication *(5)*. Insufficient adherence support to breastfeeding women living with HIV has seen postnatal HIV transmissions from mother to child remain higher than 5% in eight of the 21 high-priority countries.

Six-week and final mother-to-child transmission rates, by country, 2015



Source: UNAIDS 2016 estimates.

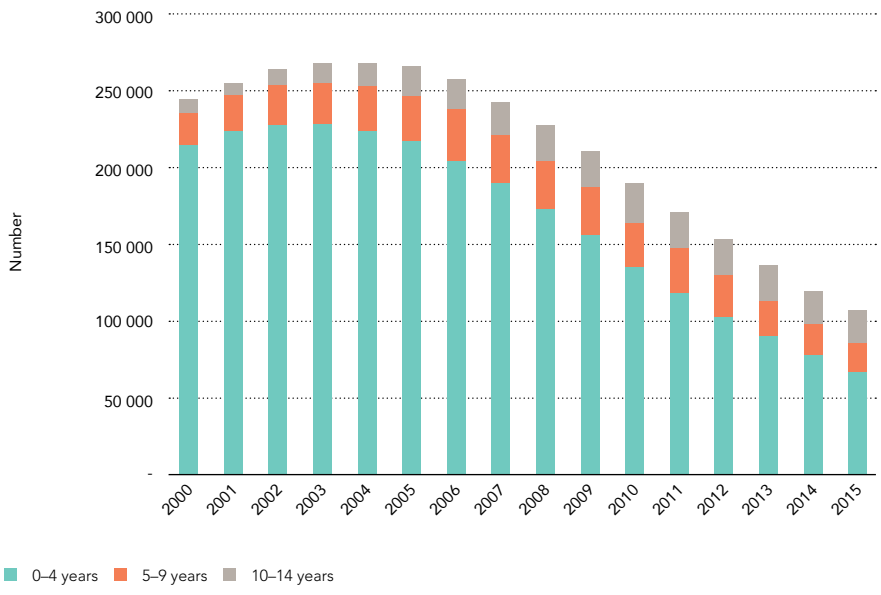
Low levels of paediatric diagnosis and slow initiation of treatment

Although AIDS-related deaths among children have reduced dramatically in recent years, the vast majority of deaths still occur during the first five years of life.

Early HIV diagnosis and early antiretroviral therapy greatly reduce infant mortality and HIV progression *(6)*. Without antiretroviral therapy, 50% of children living with HIV die before their second birthday *(7)*. Tuberculosis (TB) is a common killer. In 2015, about 40 000 children living with HIV died from TB *(8)*. Coverage of early infant diagnosis remains low, however: only 4 of 21 priority countries—Lesotho, South Africa, Swaziland and Zimbabwe—provided HIV testing to more than half the infants exposed to HIV within their first eight weeks *(9)*.

Coverage of early infant diagnosis remains low: only 4 of 21 priority countries provided HIV testing to more than half the infants exposed to HIV within their first 8 weeks.

AIDS-related deaths among children by age group, global, 2000–2015

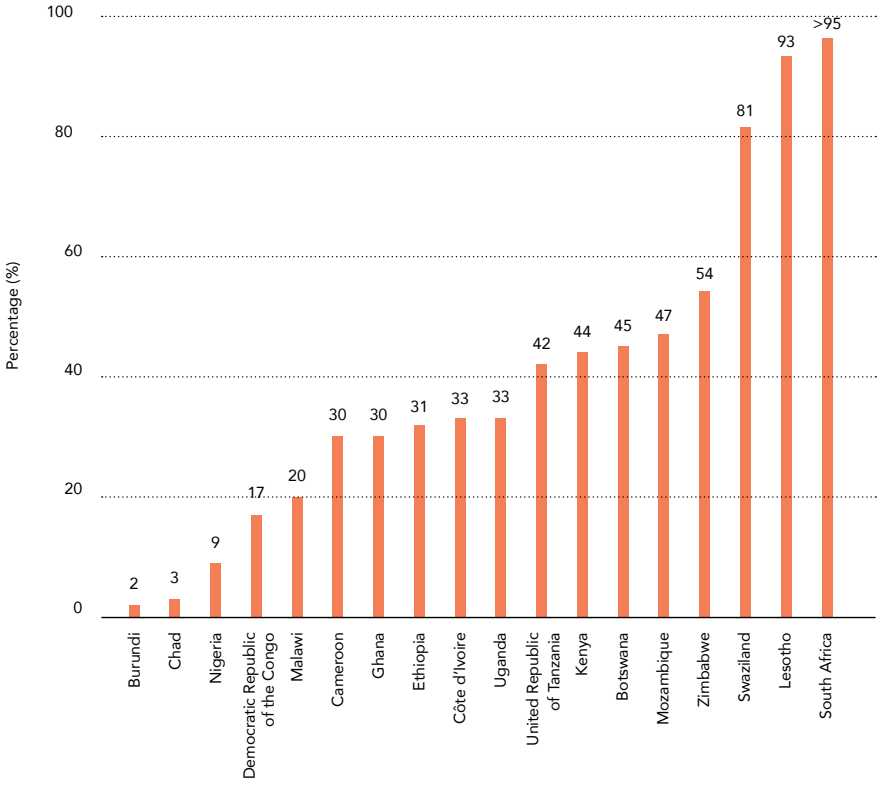


Source: UNAIDS 2016 estimates.

Even when infants are tested early, ineffective transport and poor communication systems may result in prolonged turnaround times between blood sample collection at clinics and the return of results. For example, a study in Zambia found that the turnaround time from sample collection to return of results to the caregiver was 92 days *(10)*. This leads to higher proportions of exposed infants being lost to follow-up *(11)*, initiating treatment very late or dying before they can start treatment. Others do not have access to appropriate paediatric formulations.

TB disease occurring among pregnant women living with HIV is associated with higher maternal and infant mortality *(12,13)*. Maternal TB is also independently associated with a 2.5-times increased risk of HIV transmission to exposed infants, *(14)*. All pregnant women, new mothers living with HIV should be screened for TB symptoms, and children living with HIV should be fully investigated if they have signs or symptoms suggestive of TB.

Percentage of infants born to women living with HIV receiving a virological test within the first two months of life, by country, 2015

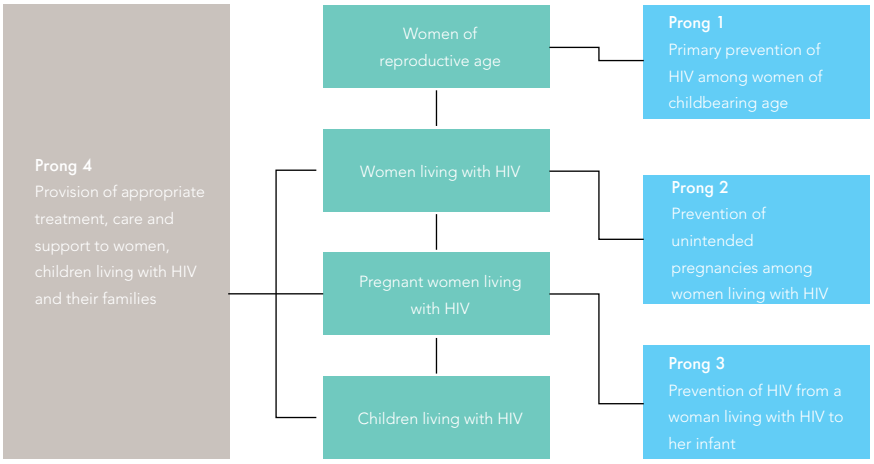


Source: 2016 Global AIDS Response Progress Reporting.

A comprehensive approach

The Global Plan and the *Start Free Stay Free AIDS Free* framework have been built on the four-pronged prevention of mother-to-child transmission of HIV framework developed by the United Nations and implementing partners in the early 2000s.

Four prongs to eliminate mother-to-child transmission of HIV and improve maternal health



Prong 1: primary prevention of HIV among women of childbearing age, including treatment provision for serodiscordant couples and services for prevention, diagnosis and treatment of sexually transmitted infections. Because childbearing age is defined in women as age 15–49 years, this prong includes a significant proportion of adolescents. A key component of Prong 1 is periodic HIV testing of women of childbearing age, including during pregnancy and breastfeeding *(15)*.

Women at substantial risk of infection should continue taking PrEP when they become pregnant and during breastfeeding.

Prong 2: prevention of unintended pregnancies among women living with HIV through family planning not only reduces the number of HIV-exposed pregnancies but also reaps the maternal and child health benefits associated with child spacing *(16)*.

Prong 3: prevention of transmission of HIV infection from pregnant women living with HIV to their children is best achieved when antiretroviral therapy is initiated by pregnant women immediately following diagnosis and maintained during breastfeeding.

Prong 4: provision of appropriate care, treatment and support for women living with HIV, and their children and families: World Health Organization (WHO) guidelines recommend immediate lifelong antiretroviral therapy for all adults and children living with HIV, regardless of viral load, CD4 count or WHO clinical stage.

Closing the gaps

Pre-exposure prophylaxis for pregnant and breastfeeding women

Oral pre-exposure prophylaxis (PrEP) is being increasingly considered as an additional HIV prevention option for pregnant and breastfeeding women in settings with continuing high HIV incidence during this period of life *(17)*. WHO recommends that women taking PrEP should continue taking PrEP when they become pregnant and during breastfeeding if they remain at substantial risk of infection. Investigators have examined the impact of the antiretroviral medications tenofovir and emtricitabine on fetal development. An extensive analysis commissioned by WHO confirmed that PrEP should be an option for pregnant and breastfeeding women in high-prevalence settings in sub-Saharan Africa, and it recommended that mothers and infants should be monitored for potential adverse effects *(18)*. Globally, pregnant and breastfeeding women within serodiscordant couples—where the male partner is living with HIV—should consider PrEP in addition to antiretroviral therapy for the male partner until viral suppression is achieved. Preventing HIV infection during pregnancy and breastfeeding has important implications for transmission to the child because women who seroconvert during pregnancy or breastfeeding are 18% and 27% likely to transmit the virus to their unborn child, respectively.

Simpler and cheaper diagnostic tools

The most commonly available virological HIV tests for infants require complex laboratory instruments and highly specialized personnel, making it difficult for caregivers in rural areas to provide consistent and timely results. Portable point-of-care systems have been developed in response to this challenge. There are currently three assays on the market that can be run from battery packs or main electricity and are rugged enough for use in mobile laboratories. Because they are small and portable, and because they can be operated by trained non-laboratory personnel, point-of-care technologies are likely to increase access to early infant diagnosis and reduce loss to follow-up *(19)*. An evaluation of the first commercially available point-of-care and near-patient testing, conducted in multiple African countries, suggests that these tests are as accurate as laboratory assays *(20)*.

Early infant diagnosis is becoming more affordable. The Diagnostics Access Initiative[1] jointly negotiated in 2015 a 35% price reduction for diagnostic kits produced by Roche Diagnostics *(21)*.

Testing infants at birth

Not all infant cases of HIV—especially when transmission from mother to child occurs during childbirth—are detectable at birth. WHO recommends testing infants born to women

[1]A partnership including UNAIDS, the World Health Organization (WHO), the Clinton Health Access Initiative (CHAI), the United States President's Emergency Plan for AIDS Relief (PEPFAR), the Global Fund to Fight AIDS, Tuberculosis and Malaria, the US Centers for Disease Control and Prevention (CDC), the African Society for Laboratory Medicine, USAID, UNITAID and UNICEF.

living with HIV at six weeks of age, as this ensures a more accurate test result. Some mothers, however, do not bring their babies back for testing at six weeks, and other babies living with HIV may die within the first six weeks. In South Africa, paediatric HIV-related deaths peak relatively early *(22)*. In an effort to ensure that more infants living with HIV are diagnosed and initiate treatment, the South African National Department of Health launched guidelines in 2015 that called for all HIV-exposed infants to be tested at birth and at 10 weeks *(23)*. South Africa's experience with at-birth testing is being watched carefully to see whether key challenges can be overcome, such as mothers not bringing their babies back for the 10-week test after their babies test negative for HIV at birth.

Linking mother–infant pairs

Point-of-care diagnostics cannot enhance paediatric outcomes unless there are parallel efforts to improve clinical service delivery. In some areas of Uganda in 2013, less than 3% of infants born to women living with HIV were retained in care after one month. With support from PEPFAR, the Ministry of Health worked with 22 health facilities to improve retention of mothers living with HIV and their babies. Mothers were interviewed to better understand their challenges. The survey showed that 80% of retention problems were caused by forgotten appointments, scheduling conflicts, lack of transport, privacy concerns and fear of disclosure to their partners. The information was used to improve the quality of care, and community representatives such as peer mothers were engaged to locate mothers and their babies who were lost to follow-up. By February 2014, 10 months after baseline, the 22 health facilities had all achieved strong gains, retaining more than 60% of mother–baby pairs *(24)*.

Sending the results of infants' virological tests by SMS has quickened the delivery of test results by an average of 17 days.

Many national health registries are still not properly formatted to facilitate longitudinal follow-up of HIV-exposed infants or mother–baby pairs. Several countries are moving to paper-based or electronic longitudinal registers that capture data on HIV-exposed infants and mother–baby pairs and prompt paediatricians to determine the final HIV status of the infant at the end of breastfeeding. Electronic health records allow for joint tracking of the mother and her infant using one tool, and enable babies to be tested and treated even when they are brought to the clinic for follow-up by someone else other than the mother.

Malawi is piloting the use of the short message service (SMS) widely available on mobile phones to send reminders to mothers who miss postnatal appointments *(25)*. SMS is also being used in Kenya, South Africa, Mozambique, Zimbabwe, Rwanda and Zambia to send the results of infants' virological tests from centralized laboratories to printers in community-level health facilities. A systematic review comparing paper-based systems and SMS systems showed that SMS printers quickened the delivery of test results by an average of 17 days *(26)*. In Kenya, the HIV Infant Tracking System (HITSystem), which sends computer alerts to early infant diagnosis and laboratory staff, and text messaging alerts to mothers, increased the proportion of HIV-exposed infants retained in care nine months after birth; decreased turnaround times between sample collection, laboratory results and notification of mothers; and increased the proportion of infants living with HIV who initiate antiretroviral therapy *(27)*.

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Finding solutions for everyone at every stage of life

15–24

young people (15–24)

Progress and gaps

The 2030 Agenda for Sustainable Development aims to improve opportunities for young people through greater access to good-quality education, health care and employment opportunities, and through the achievement of gender equality and the empowerment of all women and girls. The empowerment of young people is a key component of an effective AIDS response. Of particular importance are adolescent girls and young women in the countries hardest hit by the AIDS epidemic. In 2015 nearly 7500 young women aged 15–24 years acquired HIV every week, the vast majority in southern Africa. Women's and girls' heightened vulnerability to HIV goes far beyond physiology: it is intricately linked to entrenched gender inequalities, harmful gender norms, and structures of patriarchy that limit women and girls from reaching their full potential and leave them vulnerable to HIV.

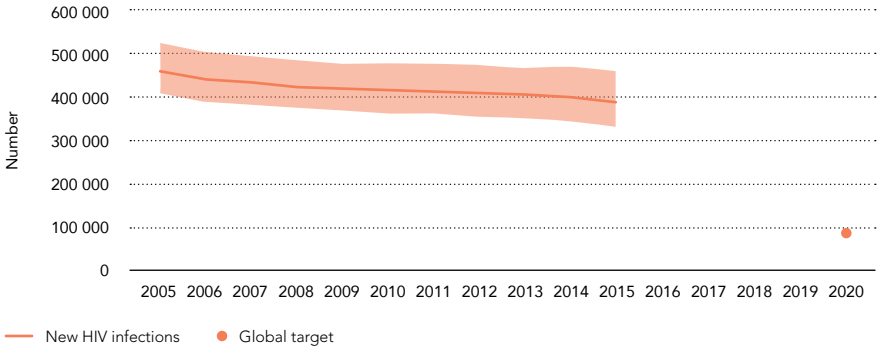
Efforts to prevent HIV infections in young people are off track. Hitting the 2020 target will require a 74% reduction in new infections among young women between 2015 and 2020.

The High-Level Task Force on Women, Girls, Gender Equality and HIV in Eastern and Southern Africa, which brings together senior government and civil society representatives from nine countries and the regional directors of UNAIDS, the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA) and UN Women, has demanded greater attention be paid to the underlying causes of this vulnerability, including laws and cultural norms that block access to sexual and reproductive health services and facilitate violence against women. The Task Force's efforts have been reinforced by the Fast-Track commitments made by the United Nations General Assembly in 2016. The Political Declaration for Ending AIDS includes a pledge to eliminate gender inequalities and end all forms of violence and discrimination against women and girls, as well as a set of bold targets:

- Reduce the number of new HIV infections among adolescent girls and young women to below 100 000 per year.
- Ensure that 90% of young people have the skills, knowledge and capacity to protect themselves from HIV.
- Ensure 90% of young people in need have access to sexual and reproductive health services and combination HIV prevention options by 2020.

Efforts to prevent HIV infections in adolescent girls and young women are off track. Between 2010 and 2015, new infections among females aged 15–24 years declined by 6%, from 420 000 [360 000–480 000] to 390 000 [330 000–460 000]. Hitting the target of 100 000 new infections among young women will require a 74% reduction between 2015 and 2020.

New HIV infections among young women (aged 15–24 years), global, 2005–2015

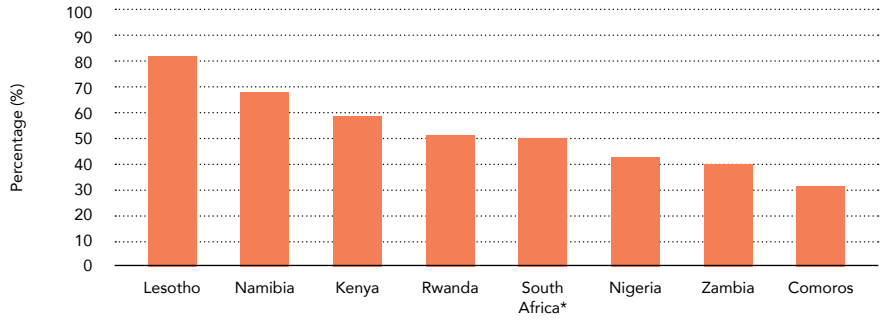


Source: UNAIDS 2016 estimates.

Country status

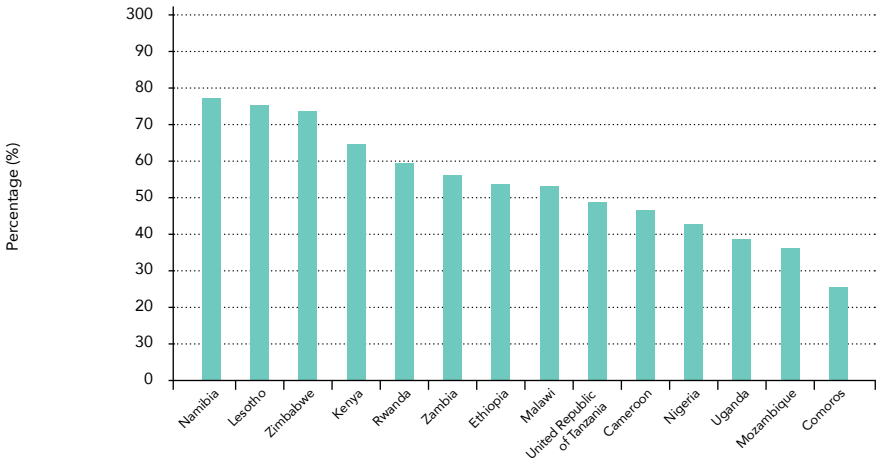
Reaching Fast-Track Targets for young people will require intensified and united efforts. Population-based surveys suggest that less than 30% of young people aged 13–18 years in eastern and southern Africa attend secondary school, while in western and central Africa approximately a third of young women aged 15–24 years report having the final say in their own health care *(1)*. Nearly a quarter of women aged 15–49 years in sub-Saharan Africa had an unmet need for family planning in 2015 *(2)*. Less than half of young women aged 15–24 years in Comoros, Nigeria, and Zambia reported using a condom the last time they had sexual intercourse with a non-marital, non-cohabitating partner. Powerful new tools for HIV prevention such as pre-exposure prophylaxis (PrEP) remain underutilized.

Percentage of young women (aged 15–24 years) reporting use of a condom at last sexual intercourse with a non-regular partner in the 12 months prior to the survey, eight countries in sub-Saharan Africa, 2012–2015



Source: Population-based surveys, 2012–2015.
*Data for South Africa refers to condom use at last sex among young women aged 15-24 who reported being sexually active.

Demand for family planning satisfied by modern methods among young women (aged 15-24 years), by country, 2010-2015



Source: Demographic and Health Surveys, 2010-2015.

Food insecurity, dropping out of school and exposure to violence have been linked to increases in HIV-related risk behaviour among young women.

Key challenges

Structural barriers

The HIV risks faced by adolescents are higher when they come of age within challenging environments. An analysis of more than 3500 adolescents aged 10–17 years in South Africa found that insufficient access to food and education, living in informal housing and exposure to community violence, mediated by psychosocial issues, predicted increased onset of HIV risk behaviour a year later *(3)*. Demographic and Health Surveys conducted in sub-Saharan Africa suggest that early sexual debut is most common among the least educated girls aged 15–19 years *(4)*. Adolescent girls who drop out of school are more likely to marry before the age of 18 years *(5)*, and child brides are often unable to negotiate safer sex, leaving them vulnerable to sexually transmitted infections, including HIV *(6)*.

Intimate partner violence

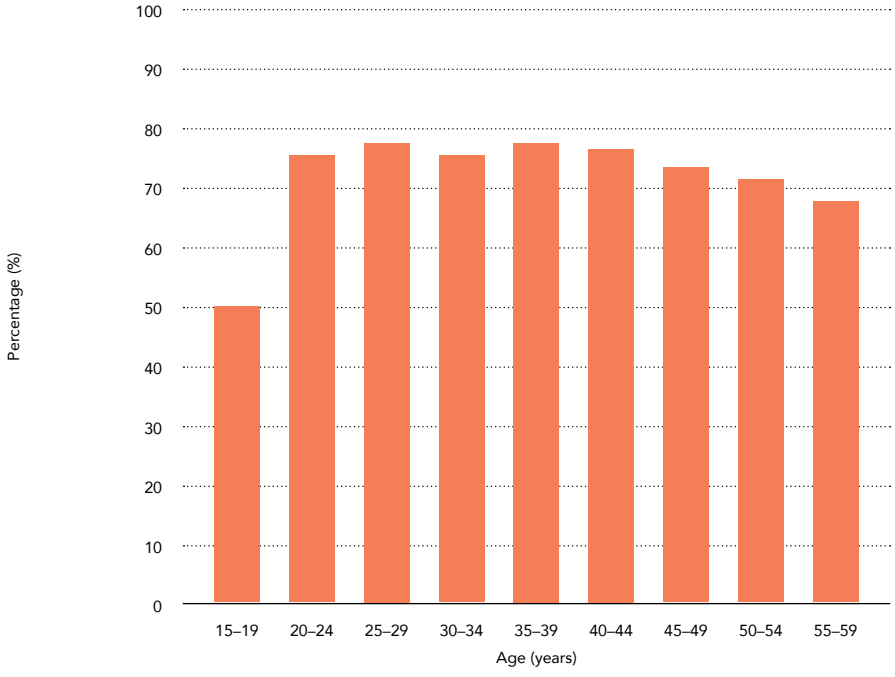
Multiple studies have shown that exposure to violence during childhood and adolescence increases HIV-related risk behaviour among adolescent girls and young women *(7)*. In some regions, women who are exposed to intimate partner violence are 50% more likely to acquire HIV than women who are not exposed *(8)*. Studies have linked intimate partner violence and even the fear of violence to women's reluctance or inability to negotiate condoms or to use contraceptives. Among women living with HIV, violence and trauma can lead to lower adherence to treatment, lower CD4 counts and higher viral loads *(7)*.

Low levels of risk perception and knowledge of HIV status

National AIDS programmes have historically struggled to persuade people at higher risk of HIV to periodically test for HIV. This has been especially the case among older adolescents and young people, who often underestimate their risk of infection *(9,10)*. Among people who tested positive for HIV within Demographic and Health Surveys conducted in 19 low- and middle-income countries (mostly in sub-Saharan Africa) between 2011 and 2015, only 50% of people aged 15–19 years had ever been tested for HIV and received the results, suggesting the other 50% were unaware of their HIV-positive status. This compared with 76% of people aged 20–24 years living with HIV and 78% of people aged 25–29 years living with HIV *(11)*.

Low risk perception has also been linked to poor adherence among young heterosexual women participating in oral PrEP pilots in sub-Saharan Africa *(12)*. These pilots have produced mixed results, with efficacy linked to whether women adhere to daily doses of antiretroviral medication *(13)*.

Percentage of people living with HIV (aged 15–59 years) who have ever been tested for HIV and received the results, by age group, 19 low- and middle-income countries, 2011–2015



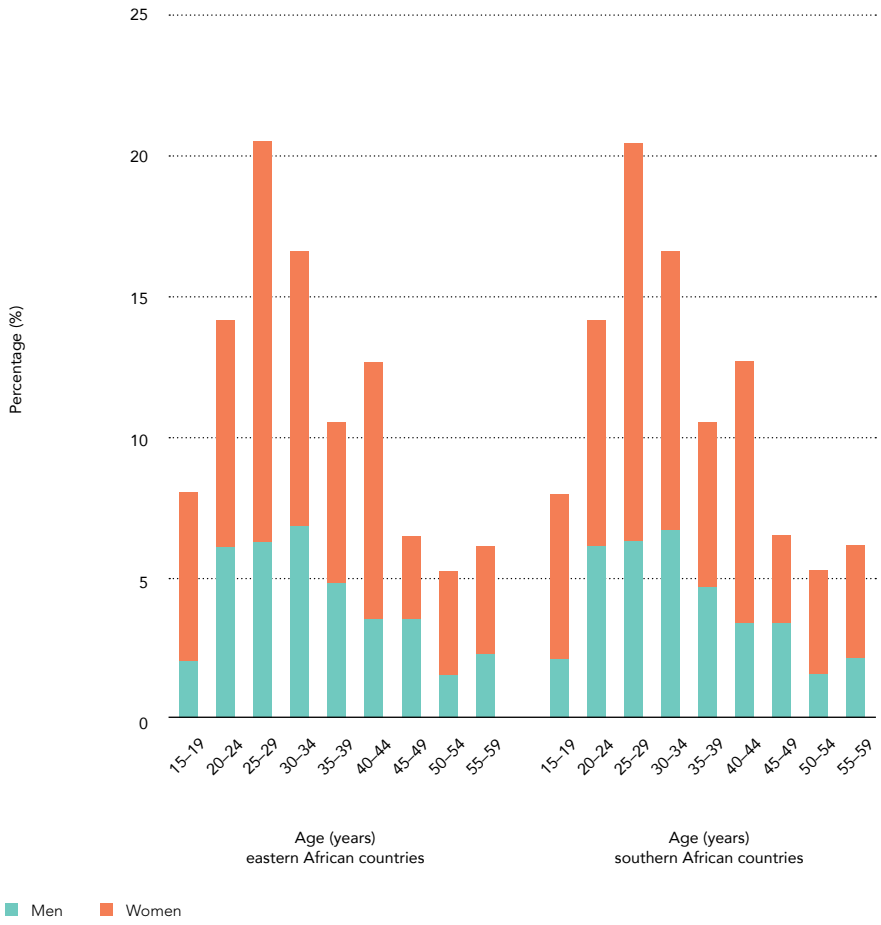
Source: Demographic and Health Surveys, 2011–2015.

There is a staggering gender imbalance in new HIV infections among young people, especially in eastern and southern Africa. In some cohorts within southern Africa, young women accounted for 91% of new infections among people aged 15–19 years.

Transmission dynamics between older men and younger women

Data from seven longitudinal studies in six locations within eastern and southern Africa over five years (2010–2014) reveal a staggering gender imbalance in new HIV infections among young people within this region. In the eastern African cohorts, 74% of new infections among people aged 15–19 years were in women; in southern Africa, young women accounted for 91% of new infections among people aged 15–19 years *(14)*. These studies and many others inform UNAIDS estimates that show adolescent girls and young women aged 15–24 years accounted for 19% of new HIV infections globally in 2015 and 23% of new HIV infections in sub-Saharan Africa. Boys and young men in the same age group accounted for 11% of new infections in sub-Saharan Africa.

Distribution of new HIV infections among men and women by five-year age groups, nine locations in eastern and southern Africa, 2010–2014.



Source: Network for Analysis of Longitudinal Population-based HIV/AIDS Data on Africa (ALPHA), 2016.

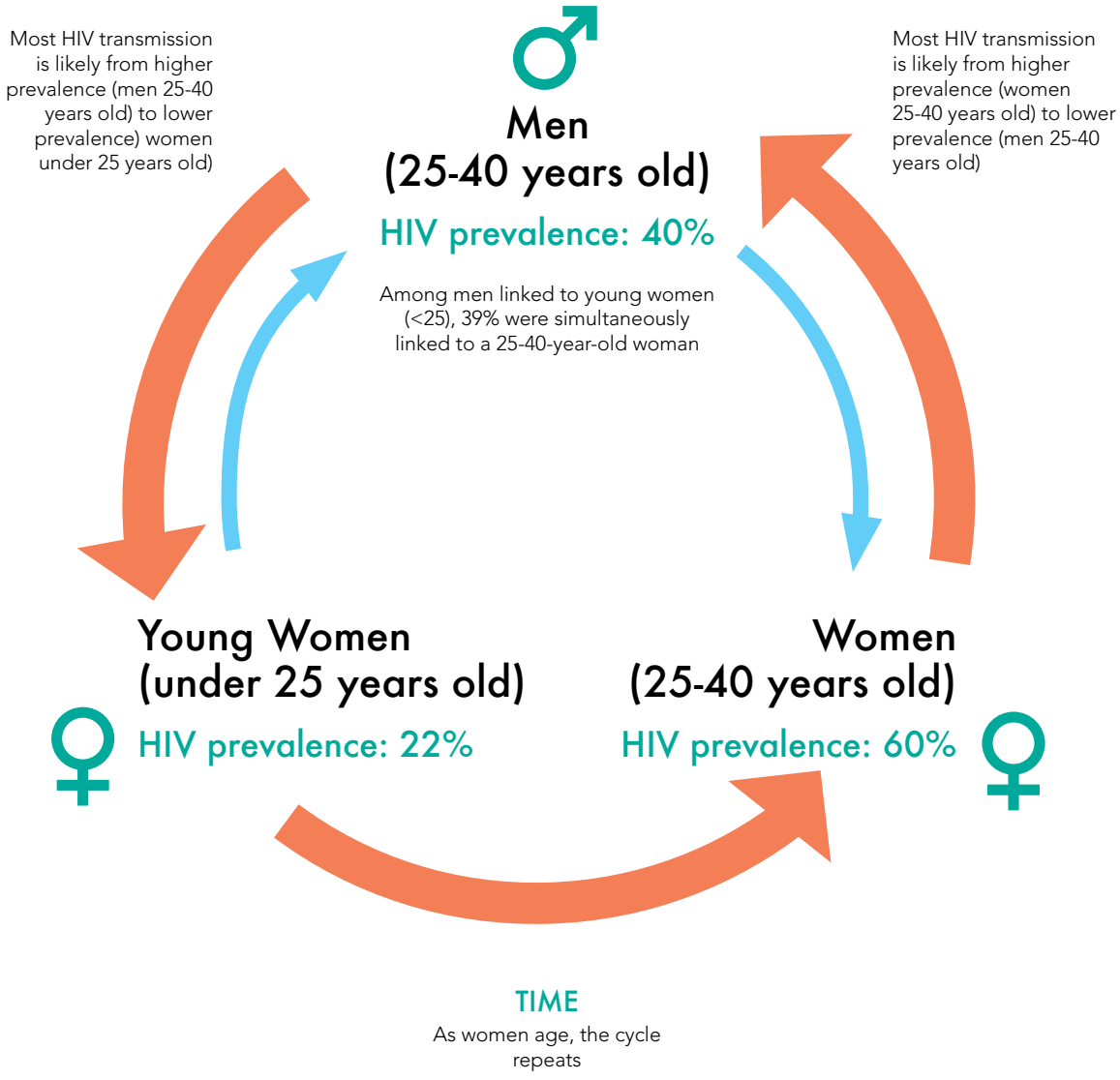
Increasing attention has been paid to the role that age-disparate relationships may play in this gender imbalance. Studies conducted in a variety of settings have suggested that larger age differences among partners are associated with lower condom use and higher rates of sexually transmitted infections among adolescent girls and young women *(15–18)*. Data from the third National HIV Communication Survey of South Africa conducted in 2012 suggest that women aged 16–24 years in age-disparate partnerships were more likely to report unprotected sex, and that sexual transmission risks were amplified among young women in urban areas *(19)*. Another study, however, found that partner age disparity did not predict HIV acquisition among young women in KwaZulu-Natal, South Africa *(20)*.

New results from a phylogenetic study in KwaZulu-Natal shed further light on how age-disparate sexual relationships appear to be an important element within high-prevalence epidemics. The Centre for the AIDS Programme of Research in South Africa (CAPRISA) analysed the blood of nearly 10 000 randomly sampled people within two districts of the province between 2014 and 2015. Adult HIV prevalence in these districts is 36% and is as high as 66% among women in their thirties *(21)*. The difference in HIV prevalence among men and women is greatest in the young age groups, reinforcing that women in this community on average acquire HIV at a younger age than men. The researchers mapped the genetic sequences of the viruses in the HIV-positive blood samples and used this information to map the sexual partnerships among the people living with HIV within the study:

- A total of 90 clusters of probable male–female transmission were identified, and within those clusters were 123 women and 103 men.
- Among the women aged under 25 years, their sexual partners were on average 8.7 years older, with 62% of these men aged 25–40 years.
- Among the women aged 25–40 years, their sexual partners were on average just 1 year older.
- Among the men aged 25–40 years linked to a woman aged under 25 years, 39% were linked simultaneously to a woman aged 25–40 years.

The most probable direction of transmission among these individuals was inferred by the levels of HIV prevalence within this community—HIV transmission is most likely to occur from high to low prevalence. Together, these data suggest that many men aged 25–40 years living with HIV may have acquired HIV from a woman aged 25–40 years, and that most of the younger women aged under 25 years living with HIV may have acquired HIV from a man aged 25–40 years. Over time, as the younger women grow older, this cycle is expected to continue *(22)*. Greater understanding of the sexual networks driving HIV transmission could help in the design of programmes to reduce HIV infection in adolescent girls and young women.

Cycle of HIV transmission, results from a phylogenetic study, KwaZulu-Natal, South Africa, 2016

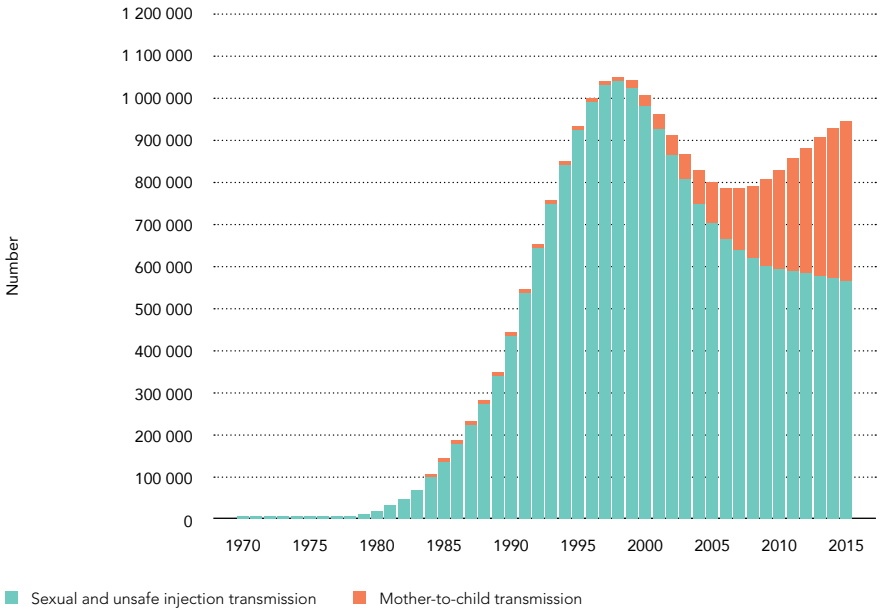


Source: Centre for the AIDS Programme of Research in South Africa, 2016.

Children living with HIV entering adolescence and adulthood

The scale-up of paediatric antiretroviral treatment has more than halved the number of AIDS-related deaths among children. Hundreds of thousands of infants born with HIV but enjoying a healthy childhood are one of the great triumphs of the AIDS response over the past decade, but this comes with new challenges.
More and more children living with HIV are entering adolescence and adulthood. An analysis of UNAIDS epidemiological data from 25 countries shows that the total number of people aged 15–19 years living with HIV in these countries grew from an estimated 800 000 in 2005 to 940 000 in 2015. Although new HIV infections among young people living with HIV have gradually declined over the past 10 years, the number of adolescents and young people who acquired their infection through mother-to-child transmission increased nearly three-fold, from an estimated 96 000 to 380 000, reaching 40% of all people aged 15–19 years living with HIV in these countries.

Number of young people living with HIV (aged 15–19 years) by mode of HIV acquisition, 25 countries,* 1970–2015



* The 25 countries included in the analysis are Botswana, Brazil, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Haiti, India, Indonesia, Iran (Islamic Republic of), Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, Rwanda, South Africa, Swaziland, Thailand, Uganda, Ukraine, United Republic of Tanzania, Zambia and Zimbabwe.
Source: UNAIDS special analysis, 2016; for more details, see annex on methodology.

This transition is magnifying a challenge faced by HIV treatment programmes: adolescents living with HIV have high rates of poor medication adherence and treatment failure *(23)*. The reasons behind this trend appear to be the manifold social, familial and psychological changes that occur during adolescence, combined with a transition from caregiver-mediated adherence within paediatric treatment to the autonomous adherence expected of adolescent patients *(24)*.

Cervical cancer

Women living with HIV are at four to five times greater risk of developing cervical cancer *(25)*. This risk is linked to the human papillomavirus (HPV), a common infection among sexually active men and women that is difficult for women with compromised immune systems (such as women living with HIV) to clear. Among women living with HIV, HPV prevalence rates can reach levels as high as 80% in Zambia and 90–100% in Uganda *(26,27)*. Minimizing deaths from cervical cancer requires a comprehensive approach. Because HPV infection is common at younger ages, a key strategy is early vaccination of adolescent girls, before sexual exposure *(28)*. HPV immunization programmes to date have been predominantly in high-income countries. Of the estimated 118 million women aimed to be reached by HPV immunization programmes conducted from June 2006 to October 2014, only 1% were from low-income or lower-middle-income countries *(29)*.

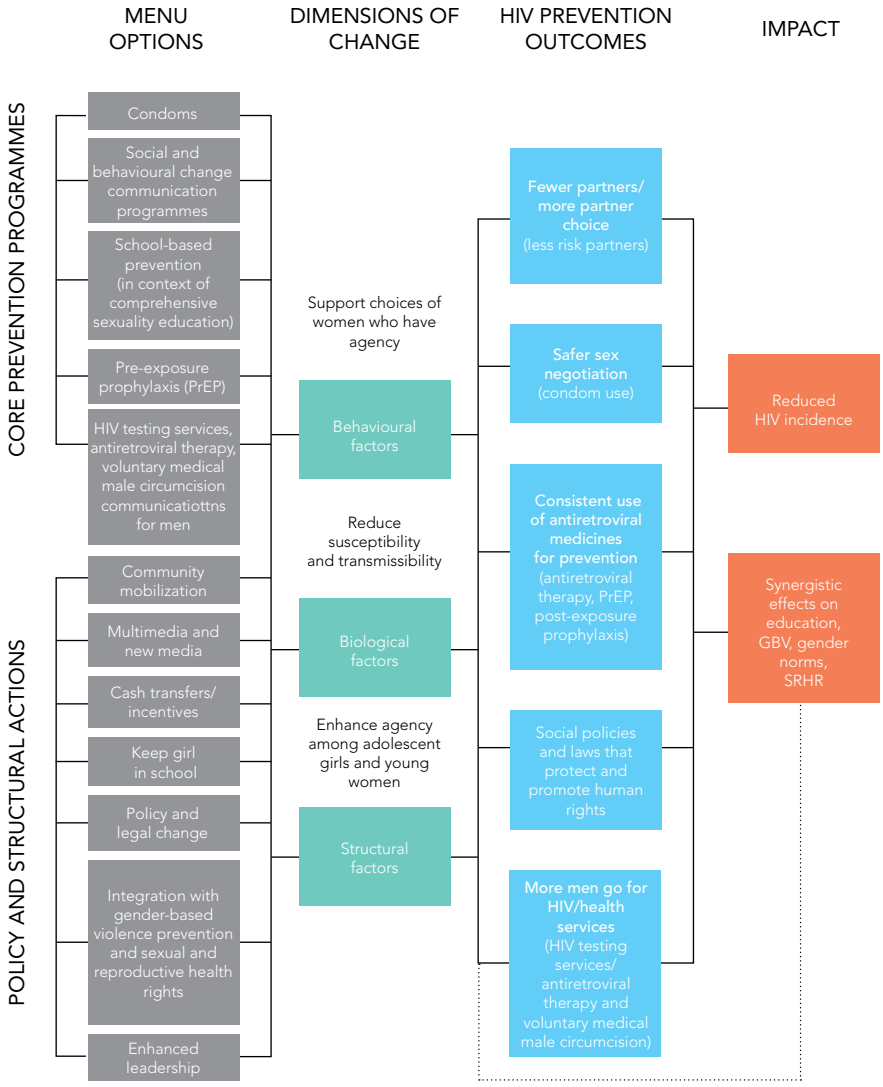
Women living with HIV are at 4–5 times greater risk of developing cervical cancer.

Synergies between the HIV response and efforts to prevent, diagnose and treat cervical cancer through HPV vaccination, education, screening and treatment must be maximized *(30)*.The Cervical Cancer Prevention Program in Zambia has demonstrated that linking cervical cancer screening and HIV services is a cost-effective way of improving cervical cancer screening and treatment. This programme, which integrated a national cervical cancer prevention programme into an existing HIV programme, led to an expansion of cervical cancer screening to more than 100 000 women (28% of whom were living with HIV) over a period of five years *(31)*.

A comprehensive approach

Reducing new HIV infections among adolescent girls and young women to below 100 000 per year by 2020 requires comprehensive approaches tailored to local contexts. UNAIDS has developed an options menu from which countries and districts can choose a mix of structural and programmatic actions, based on country data and local contexts *(32)*.

Detailed strategy mix for HIV prevention among young women–a menu of options



Core prevention programmes

Social and behaviour change communication programmes entail a combination of different activities, ranging from individual counselling to small-group, community and media activities.

School-based HIV prevention: school presents an opportunity to reach a substantial proportion of adolescent girls at low cost in order to address key HIV prevention issues that affect them. School-based HIV prevention consists mostly of interpersonal communication approaches, but it should also involve condom distribution, which is still unavailable in school-based programmes in most high-prevalence settings. Comprehensive sexuality education incorporates other sexual and reproductive health issues, including early pregnancy, improving understanding of puberty, and building confidence in communication and relationships among learners.

Condoms: when used consistently and correctly, condoms are highly effective in preventing the sexual transmission of HIV. Condom availability and accessibility need to be rolled out in combination with promoting and enhancing women's ability to negotiate condom use.

PrEP is the use of antiretroviral medicines by HIV-negative people to avoid HIV infection. The World Health Organization (WHO) recommends the use of oral PrEP by all population groups at substantial risk of HIV infection (HIV incidence of about 3 per 100 person-years or higher). Oral PrEP is highly effective when the medication is taken regularly; research on other forms of PrEP is ongoing.

HIV testing services can be a critical entry point for prevention communication. HIV testing services should reinforce key communication messages to increase sexual risk perception in the specific epidemic context.

Immediate offer of antiretroviral therapy for all people diagnosed with HIV is critical to realizing population-level prevention effects of antiretroviral therapy for adolescent girls and young women.

Voluntary medical male circumcision is a cost-effective, one-time intervention that provides lifelong partial protection against female-to-male HIV transmission, and contributes to lowering community-level HIV prevalence, thereby protecting women.

Policy change and structural programmes

Community mobilization is a process that helps communities identify, respond to and address their needs. Community mobilization and participation has made substantial contributions to HIV prevention, including among adolescent girls and young women. In practice, community mobilization approaches are often

implemented through the same channels and organizations as, and complement, social and behavioural change communication programmes. The active, informed and voluntary participation of young people in decision-making processes, including the design, implementation and monitoring of programmes which affect their health, is vital to strengthening the effectiveness of the response.

Multimedia and new media: mass media components (including radio and television programmes) are often part of social and behaviour change communication programmes. A range of approaches have been applied for HIV prevention, including call-in programmes, talk shows, soap operas with HIV prevention messages, and advertising for condoms and HIV testing services. New media and multimedia approaches are particularly relevant for adolescent girls and young women due to the increased availability of smartphones.

Cash transfers and social grants: several recent studies show promising effects of cash transfers and other economic incentives for preventing HIV among girls and young women *(33)*. Cash transfers are more likely to have an effect on reducing HIV if they can increase schooling or meet survival needs and thereby prevent adolescent girls from engaging in transactional and age-disparate relationships.

Keeping girls in school: increased school attendance can reduce the risk of adolescent girls acquiring HIV, in three different ways. First, being in school reduces early marriage and risky sexual partnerships *(34, 35)*. Second, in advanced HIV epidemics, higher educational attainment is itself associated with reduced HIV prevalence later in life and with safer behaviours *(36)*. Third, keeping girls in school ensures that greater numbers of adolescent girls can access HIV prevention information in the context of comprehensive sexuality education or school-based campaigns.

Other policy and legal changes: provision of youth-friendly services in health facilities, removal of legal barriers to adolescents' use of HIV and sexual and reproductive health services, ending child marriage, and passing and enforcing legislation against gender-based violence are determinant factors of a conducive and enabling environment to ensure all young people, adolescent boys and adolescent girls have access to HIV and other sexual and reproductive health services. In addition, some countries have policies related to parental, age, spousal and other third-party consent requirements that hamper young people's access HIV testing and counseling, and other sexual and reproductive health services. Stronger political advocacy is required in many countries to increase the pace of policy and legislative change.

Integration: although HIV remains the single largest health concern for adolescent girls and young women in high-prevalence settings, they also face a range of other health issues, including gender-based violence and sexual, reproductive and maternal health needs. Synergies in programme delivery, increases in service utilization, and improvement in health outcomes can be achieved through integration of these services.

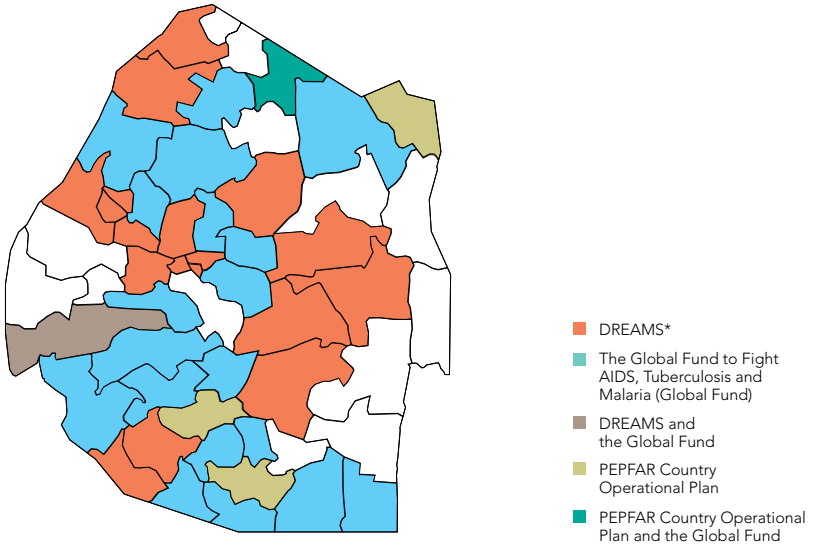
Leadership and role models: leadership involvement in development programmes is commonly applied as a strategy to build ownership and improve community understanding, thus opening the way towards sustainability. In high-prevalence locations, leaders can serve as role models for how society engages and interacts with young women.

Closing the gaps

Bringing comprehensive approaches to scale

Combining a range of evidence-informed health services and structural changes is critical to reducing HIV infections and improving treatment outcomes among adolescents and young people. The DREAMS partnership[1] is investing US$ 385 million to put in place comprehensive approaches for adolescent girls and young women within dozens of communities in 10 sub-Saharan African countries.[2] Reaching the Fast-Track Targets will require rapid expansion of this comprehensive approach. In Swaziland, a grant from the Global Fund to Fight AIDS, Tuberculosis and Malaria (Global Fund) is helping to bring this approach to scale. Together, the DREAMS partnership, the Global Fund and PEPFAR are covering 43 of the country's 55 administrative subdivisions.

Programmes for adolescent girls and young women (aged 15–24 years) in Swaziland, 2016



*DREAMS is supported by the United States President's Emergency Plan for AIDS Relief (PEPFAR), the Bill & Melinda Gates Foundation, Girl Effect, Johnson & Johnson, Gilead Sciences, and ViiV Healthcare.
Source: Swaziland Central Statistics Office 2016; PEPFAR Swaziland 2016.

[1] Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe Women. The partnership is supported by the United States President's Emergency Plan for AIDS Relief (PEPFAR), the Bill & Melinda Gates Foundation, Girl Effect, Johnson & Johnson, Gilead Sciences and ViiV Healthcare.

[2] Kenya, Lesotho, Malawi, Mozambique, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. Together, these countries accounted for an estimated 55% of new HIV infections among adolescent girls and young women in 2015.

In South Africa, a three-year national HIV prevention campaign for adolescent girls and young women, entitled SheConquers, was launched in 2016. SheConquers is built around a five-point strategy that aims to decrease new HIV infections, teenage pregnancies and gender-based violence among young women and adolescent girls, to increase and retain young women and adolescent girls in school, and to increase economic opportunities for young people, particularly young women *(37)*.

A key component of these programmes is comprehensive sexuality education within schools, which provides young people with the knowledge and skills to make conscious, healthy and respectful choices about relationships and sexuality. There is strong evidence that comprehensive sexuality education improves HIV knowledge and self-efficacy related to refusing sex or condom use, and contributes to delayed sexual debut and increased condom use, thus reducing sexually transmitted infections, HIV transmission and unintended pregnancy *(38)*.

The Eastern and Southern African Ministerial Commitment on Comprehensive Sexuality Education and Sexual and Reproductive Health Services for Adolescents and Young People was endorsed in December 2013 by ministers of education and health from 20 countries in eastern and southern Africa. Progress made during two years of implementation (2014–2015) showed that targeted interventions, sound strategies, adequate resources and political will can stimulate reductions in HIV infections, early and unintended pregnancies, gender-based violence and child marriage *(39)*.

Comprehensive sexuality education is increasingly provided to adolescents and young people in high-prevalence settings. Among 21 countries in sub-Saharan Africa with available data, 12 include comprehensive sexuality education in at least 40% of their secondary schools *(39)*; most, however, do not include critical components on human rights and gender. Comprehensive sexuality education programmes with an explicit focus on gender rights and gender power dynamics are five times more effective than those that do not, particularly in reducing unwanted pregnancies and incidence of HIV and other sexually transmitted infections *(40)*.

A combination of HIV risk awareness, economic empowerment and oral PrEP is a potentially powerful HIV prevention method for young women living within extremely challenging economic and social circumstances.

Female-controlled prevention methods

As communities and cultures work towards an enabling environment, young women at high risk of HIV infection require discreet and practical prevention options, such as oral PrEP. Participants in a pilot conducted by CAPRISA illustrate that a combination of HIV risk awareness, economic empowerment and oral PrEP can be a powerful HIV prevention method within extremely challenging economic and social circumstances. For example, a 22-year-old single mother from the Umlazi township in KwaZulu-Natal, South Africa described how she maintains several sexual relationships with men who support her financially. Some of these partners refuse to wear condoms. Oral PrEP helps address her substantial HIV risks as she works to build a sustainable livelihood as a pig farmer *(22)*.

The adherence challenges of oral PrEP are being addressed through experimental rings that continuously release the antiretroviral drug dapivirine within the vagina. The most recent results of phase III clinical trials show that that these vaginal rings reduced HIV infections by at least 56% when used consistently, and reduced HIV risk by 75% or more among a subgroup of participants who appeared to use the ring the most *(41)*.

Voluntary medical male circumcision

More than 11 million adolescent boys and men have been voluntarily circumcised in 14 priority countries within eastern and southern Africa since 2008.

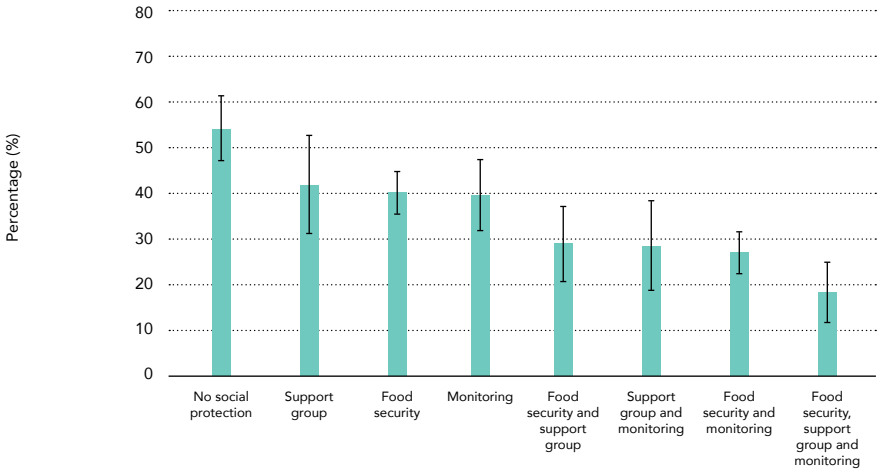
Few policies and programmes currently focus on improving the health-seeking behaviour of young men. As a result, such behaviour is generally poor *(42)*. Voluntary medical male circumcision, which provides men with lifelong partial protection against HIV infection, is a potentially important entry point for providing men and boys with broader, more appropriate health packages. More than 11 million adolescent boys and men have been voluntarily circumcised in 14 priority countries within eastern and southern Africa since 2008, a success story that has prompted WHO and UNAIDS to launch a new, more holistic framework for action: VMMC2021. VMMC2021 has two main targets: by 2021, 90% of males aged 10–29 years will have been circumcised in high-priority settings in sub-Saharan Africa; and 90% of males aged 10–29 years will have accessed age-specific health services tailored to their needs.

Social protection reduces HIV risk and improves treatment adherence

Social protection programmes are increasingly recognized as facilitators of improved HIV prevention and treatment outcomes. Cash transfers and other financial incentives have been used successfully to incentivize safer sexual practices in Lesotho and the United Republic of Tanzania *(43,44)*. In South Africa, augmenting financial support with social support from parents and teachers, free education and care and support services increased HIV-prevention benefits among adolescents and young people over cash alone *(45)*. Past-year incidence of economically driven sex was 10.5% among girls aged 12–18 years participating in a study between 2009 and 2012 who did not receive any social protection measures. Among those who received cash transfers alone, 5.7% engaged in economically driven sex; and when cash, free education and parental monitoring were combined, only 2.1% engaged in economically driven sex *(45)*.

Combining social protection provisions also increases the effectiveness of antiretroviral therapy. A study of 1059 adolescents aged 10–19 years living with HIV in South Africa showed that three social protection provisions—nutritional support of two meals a day, attending an HIV support group, and ensuring high parental/caregiver supervision—were associated with improved treatment adherence *(24)*. Fifty-four per cent of adolescents receiving no social protection provisions reported non-adherence to antiretroviral therapy within the past week. Among adolescents who received cash transfers and provisions of food, attended a support group and benefited from high parental supervision, only 18% reported non-adherence *(24)*.

Past-week adolescent antiretroviral therapy non-adherence, by access to various social protection measures, South Africa, 2016



Source: L. D. Cluver, E. Toska, F. M. Orkin, F. Meinck, R. Hodes, A. R. Yakubovich & L. Sherr (2016) Achieving equity in HIV-treatment outcomes: can social protection improve adolescent ART-adherence in South Africa?, AIDS Care, 28:sup2, 73-82, DOI: 10.1080/09540121.2016.1179008.

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Finding solutions for everyone at every stage of life

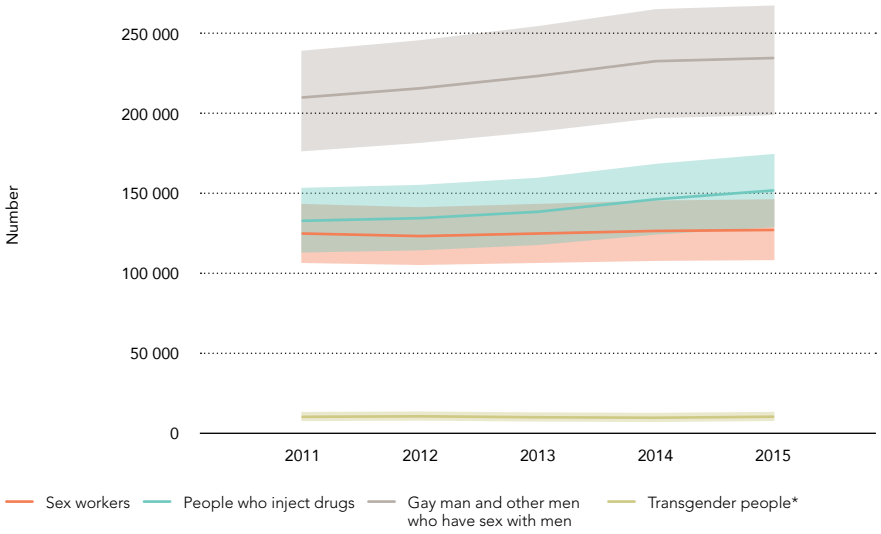
Key populations throughout the life cycle

Progress and gaps

Communities of people who inject drugs, sex workers, transgender people and men who have sex with men are among the hardest hit by the AIDS epidemic. HIV prevalence within these groups is 5–49 times higher than in the general population, and an estimated 36% of all new infections in 2014 were among key populations and their sexual partners *(1)*.

Reaching key populations with comprehensive HIV prevention services is critical to achieving the global target to reduce new HIV infections to fewer than 500 000 by 2020. However, few countries and cities have mounted comprehensive responses for key populations. Stigma, discrimination and criminalization are day-to-day barriers to services in too many countries. HIV infection trends among key populations reflect this. The available data are sparse and difficult to aggregate but suggest that new HIV infections among people who inject drugs globally climbed from an estimated 114 000 in 2011 to 152 000 in 2015; new infections among sex workers remained virtually unchanged at 125 000 a year over the same period. For men who have sex with men, new infections rose by about 12% from 2011 to an estimated 235 000 new infections in 2015. The few available data on transgender people suggest a stable rate in new infections over the same time period.

Trends in new HIV infections among key populations, global, 2011–2015

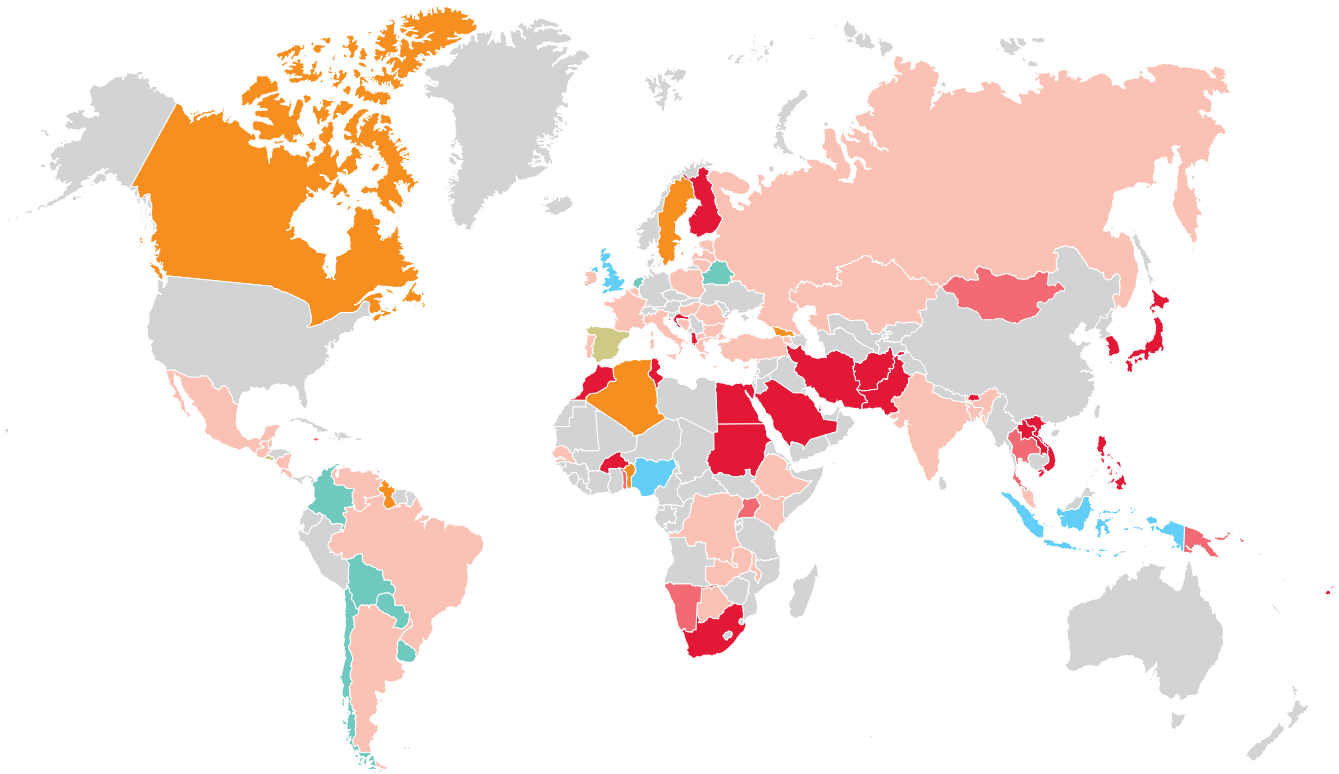


* Data on transgender people are from the Asia-Pacific and Latin America and Caribbean regions only.

Source: UNAIDS special analysis, 2016.

Country status

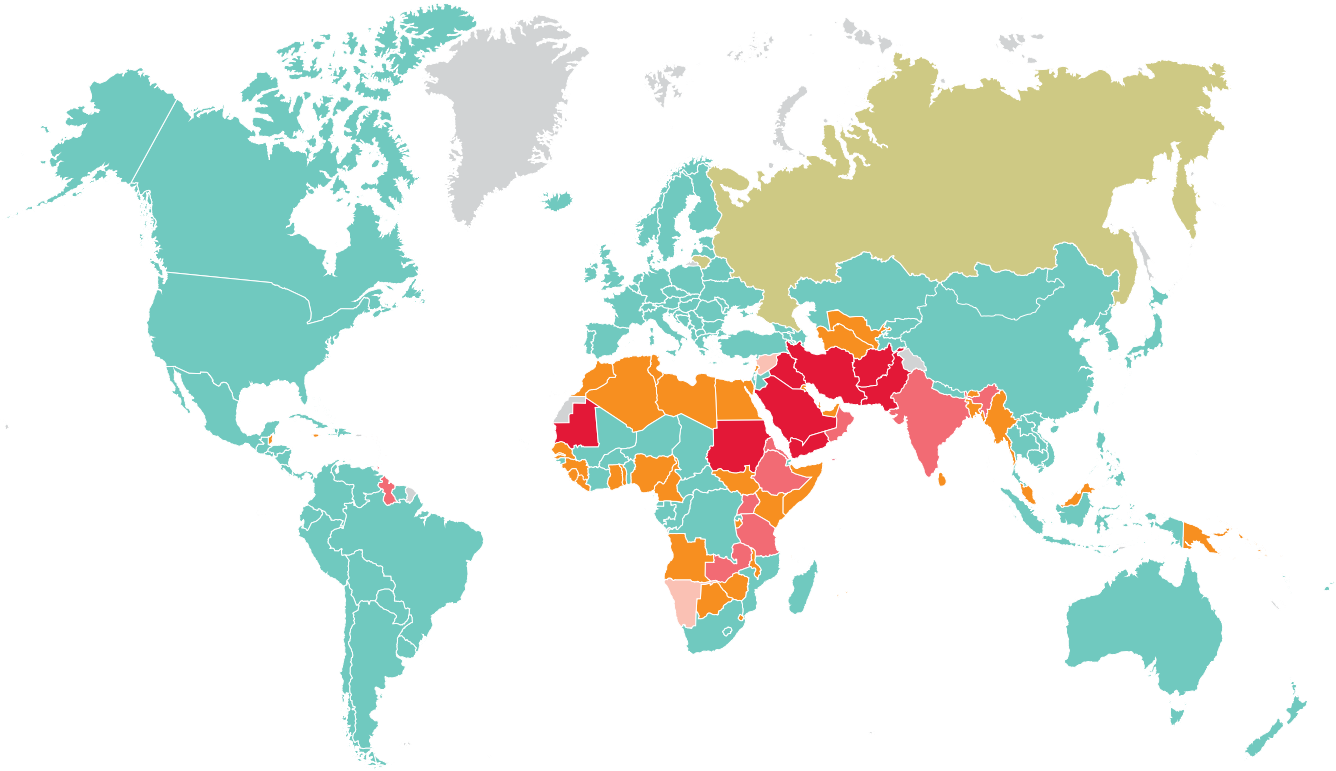
Criminalization of any aspect of sex work, by country, 2016



- Selling and buying sexual services criminalized
- Selling sexual services criminalized
- Buying sexual services criminalized
- Partial criminalization
- Other punitive regulation
- Not subject to punitive regulation /not criminalized
- Issue determined /differs at subnational level
- Data not available

Source: Sexual Rights Initiative. 2016. National sexual rights law and policy database. (http://sexualrightsdatabase.org/page/welcome, accessed 13 November, 2016).

Criminalization of same-sex sexual relations, by country



- Death penalty
- Imprisonment 15 years to life
- Imprisonment up to 14 years
- Relationship between males is illegal, no penalty specified
- Promotion ("propaganda") laws limiting freedom of expression
- Laws penalizing same-sex sexual acts decriminalized, or never existed
- Data not available

Source: International Lesbian, Gay, Bisexual, Trans and Intersex Association, State Sponsored Homophobia 2016: A world survey of sexual orientation laws: criminalisation, protection and recognition (Geneva; May 2016).

Key challenges

Young people within key populations

Young people within key populations face particular HIV risks, often due to lower knowledge of risks or lower ability to mitigate those risks compared with their older, more experienced counterparts. A study of female sex workers in three main urban areas of Mozambique (Maputo, Beira and Nampula) found that young women who sell sex (aged 15–17 years) were less likely to access available testing and treatment services *(2)*.

In Kumasi, one of the largest cities in Ghana, sex workers aged 18–20 years expressed accurate knowledge of HIV and intentions to consistently use condoms with clients; however, factors such as higher payments, drug and alcohol use, fear of violence and police harassment interrupted these intentions *(3)*.

Young people within key populations face particular HIV risks, often due to lower knowledge of risks or lower ability to mitigate those risks compared with their older, more experienced counterparts.

Available epidemiological data suggest that young men who have sex with men have greater HIV risk than both heterosexual young people and older men who have sex with men *(4)*. Social and structural factors play an important role in the frequency of unprotected anal sex with partners living with HIV among young men who have sex with men. Young men who have sex with men are often more vulnerable to the effects of homophobia (manifested in discrimination, bullying, harassment, family disapproval, social isolation and violence), criminalization and self-stigmatization *(4)*. These can have serious repercussions for their physical and mental health; their ability to access HIV testing, counselling and treatment; their emotional and social development; and their ability to access education, vocational training and viable work opportunities *(4)*. Use of drugs or alcohol and selling sex contribute to HIV risk and represent overlapping vulnerabilities that some young men who have sex with men share with other young key populations.

Young people who inject drugs are more likely than older people to lack knowledge about safer injecting practices and HIV prevention, and to be unaware of risks to their health *(4)*. The few data available on young people who inject drugs suggest their HIV risk is extremely high. A 2011 study found that more than a quarter of young people who injected heroin in Dar es Salaam, United Republic of Tanzania, were living with HIV *(5);* and a 2010 survey of street youth across multiple cities in Ukraine found that a third of people aged 15–17 years who injected drugs were living with HIV *(6)*.

Insufficient domestic financing for key populations and lack of social contracting

As international aid levels stagnate and donor priorities evolve, greater domestic investments in HIV are being made. Within this global trend, however, key populations have been woefully left behind in many countries. Between 2010 and

2014, among 85 countries that reported spending on services for men who have sex with men, only nine countries were funding more than half of their HIV response, only eight countries put in more than 10% of the total, and more than two thirds of reporting countries relied on international sources for almost 100% of their spending on these services.[1] On average, domestic funding accounted for only 12% of spending on prevention programmes for men who have sex with men. The percentage of total prevention spending that comes from domestic sources is similarly low for sex workers (20%) and people who inject drugs (25%) *(1)*. Even when programme financing is picked up by national governments, community-based organizations previously funded from international sources may be dropped from programmes, despite overwhelming evidence that their engagement is critical to the success of these programmes. Peer-supported education, condom distribution and referral to health services tend to be neglected in favour of clinical approaches that emphasize HIV case finding and treatment. The establishment of social contracting mechanisms for services provided by such organizations is critical to the sustainability and effectiveness of efforts to deliver HIV services to key populations.

Human rights barriers to accessing services

30% of countries report having laws, regulations or policies that are barriers to effective HIV prevention, treatment, care and support for men who have sex with men, people who inject drugs, sex workers and transgender people.

The highest attainable standard of health, including access to affordable, timely health-care services, is a basic human right for all, including key populations *(8)*. The HIV response can effectively tackle the public health threat posed by the epidemic only if punitive legal environments, stigma, discrimination and other human rights barriers that routinely block key populations from health services are addressed. These barriers exist in multiple settings, including health, education, employment, community, law enforcement and justice.

Thirty per cent of countries report having laws, regulations or policies that are barriers to effective HIV prevention, treatment, care and support for men who have sex with men, people who inject drugs, sex workers and transgender people *(9–14)*. Criminalization of sex work, drug use and same-sex acts, and other punitive practices, policies and laws prevent systematic programming. HIV and other health services are often unavailable in prison, and a history of imprisonment can compound marginalization and exclusion.

Same-sex sexual relations are criminalized in 73 countries—approximately one third of the world same-sex sexual relations *(15)*. Men who have sex with men living within these legal environments are deterred from seeking HIV-related services. In other countries, notably the Russian Federation and Lithuania, the ill-defined concept of "promoting homosexuality" has been criminalized; laws related to this have been used to attack lesbian, gay, bisexual, transgender and intersex rights rights groups and

[1] More than 50%: Colombia, Dominica, Chile, Cuba, Sri Lanka, Malaysia, Mexico, Algeria, Mauritius. more than 10%: Costa Rica, Guatemala, Pakistan, Kazakhstan, Mauritius, Suriname, Thailand, Congo *(7)*.

have had a serious impact on the ability to provide community-based HIV prevention services *(15)*. Similarly, transgender people typically face a lack of legal recognition of their gender and are not explicitly included in anti-discrimination laws *(16)*, and there are laws in 55 countries that criminalize transgender people or are used to prosecute them *(13)*.

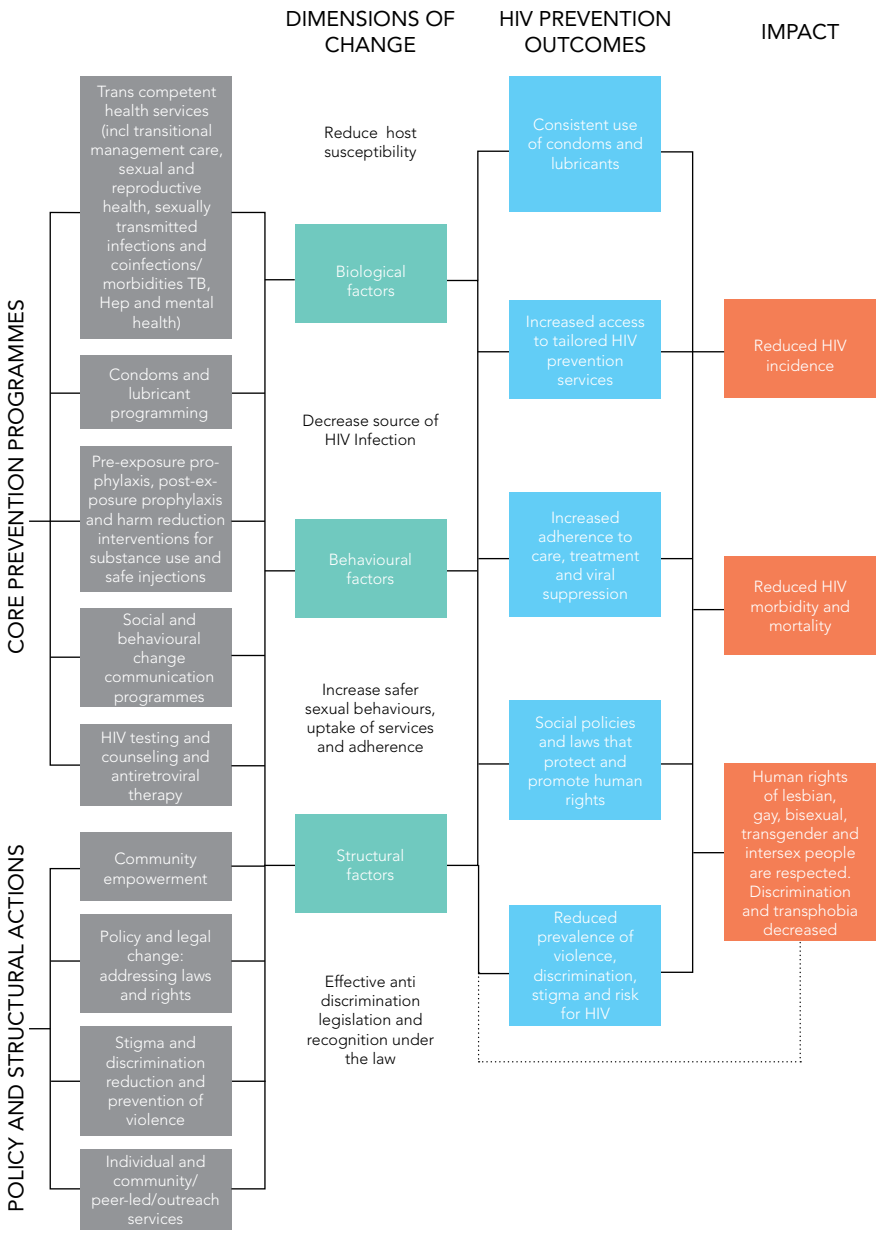
When it is illegal to possess small quantities of drugs for personal use, people who inject drugs are more likely to engage in high-risk practices such as sharing needles. The fear of being arrested by police prevents people who inject drugs to access harm reduction and other HIV and health services. Alongside HIV, people who use drugs are extremely vulnerable to hepatitis C and tuberculosis. An estimated 10 million people who inject drugs have hepatitis C infection *(18)*. Other punitive laws, policies and practices include discrimination against people with a history of drug use, mandatory registration of people who use drugs, and denial of harm-reduction measures *(19)*. Drug-related offences carry the death penalty in 31 countries, and the death penalty is actively enforced in 7 of these *(12)*. Women who use drugs, especially those who inject drugs, face higher levels of stigma, discrimination and vulnerability to harm than their male counterparts. In some countries they have been forced to undergo sterilization or abortions, separated from their children and denied public housing and other benefits *(19)*.

The criminalization of sex work puts sex workers at risk of violence from law enforcement officers and clients because they have no recourse to the law. Selling and/or buying sex is partially or fully criminalized in at least 39 countries *(11)*. In many more countries some aspect of sex work is criminalized, and in other countries general criminal law is applied to criminalize sex work (for example, laws against loitering and vagrancy). When possession of condoms is used by the police as evidence of sex work, this greatly increases the risk of HIV among this key population *(1)*. Even where sex work is not criminalized, sex workers are rarely protected under the law *(21)*.

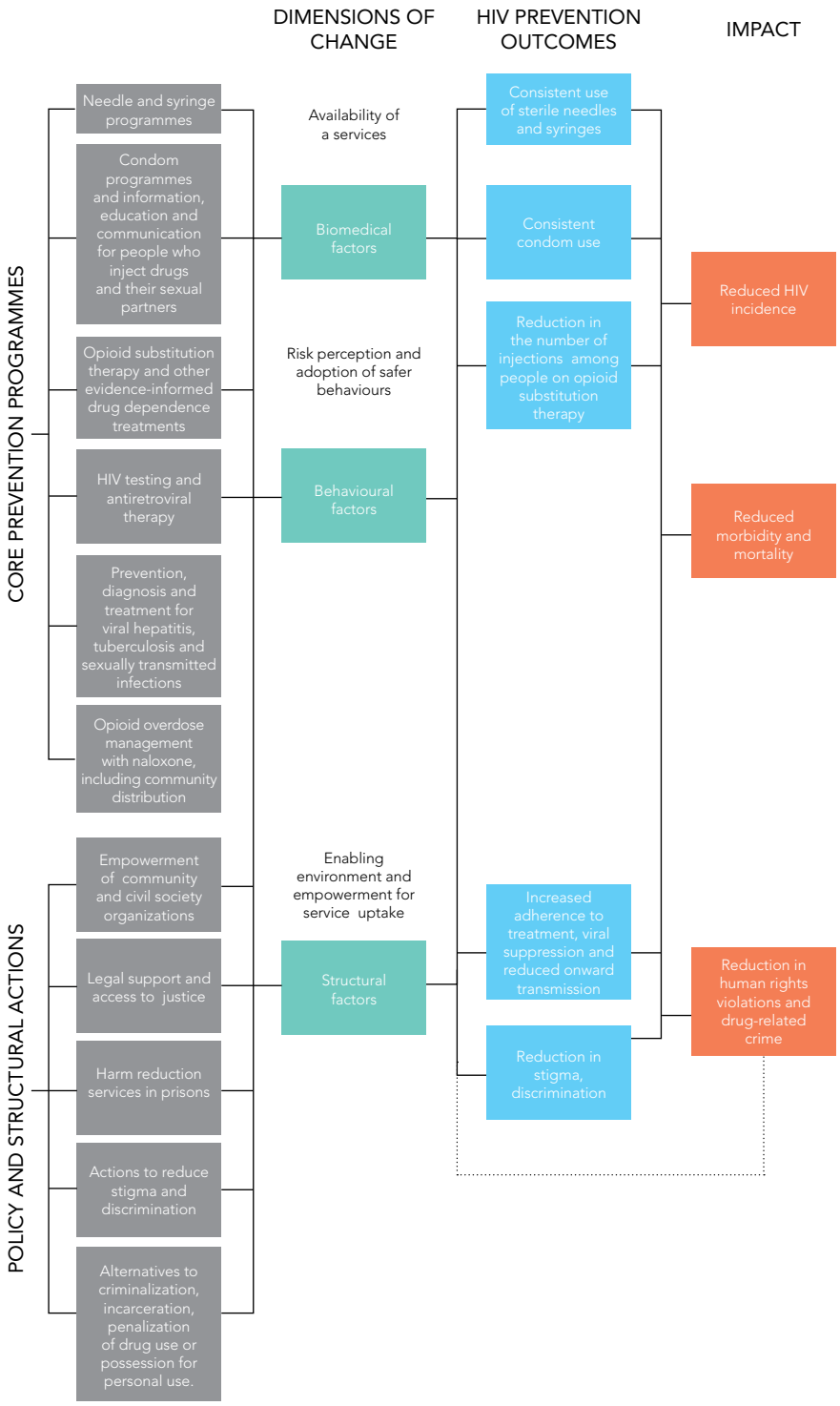
Criminalization of key populations contributes to incarceration in prisons and other closed settings where HIV and tuberculosis risks are compounded by overcrowding and limited access to HIV and other health services. As a result, people in prisons are at high risk of HIV infection, HIV-related comorbidities and AIDS-related deaths. Injecting drug use is much more common in prisons than among the general population. Paradoxically, the provision of harm reduction services in prisons is extremely rare *(19)*. The prevalence of hepatitis C virus ranges from 3.1% to 38% among prisoners and has been linked to sharing injecting equipment, tattooing and unprotected sexual intercourse *(22)*. A high prevalence of HIV, overcrowding, poor ventilation, drug use and previous unhealthy lifestyles have been identified as contributors to the spread of tuberculosis within prisons *(23)*. A systematic review found that improving tuberculosis control in prisons would significantly reduce a country's overall tuberculosis disease burden *(24)*.

Comprehensive approaches

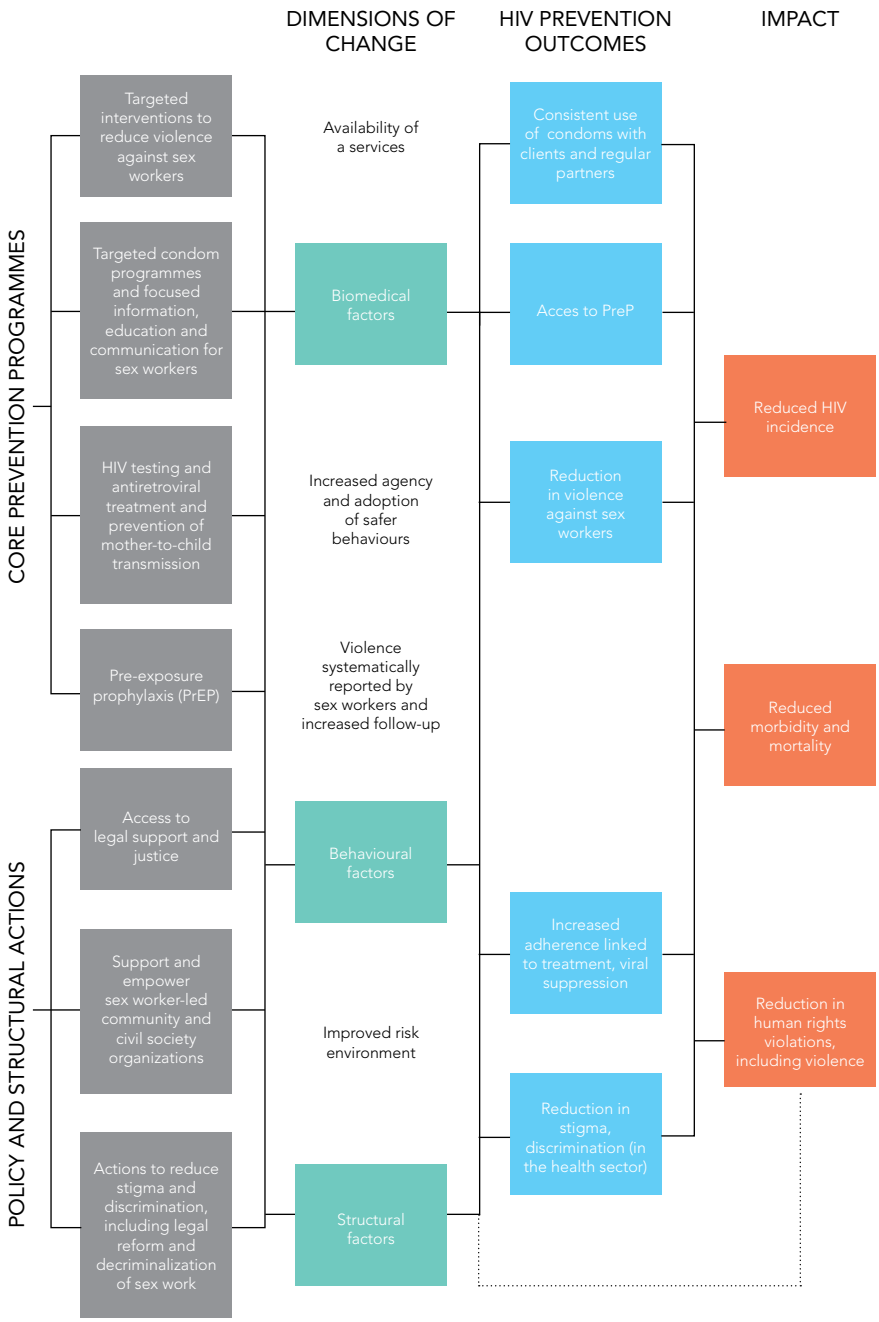
Detailed strategy mix for HIV prevention among transgender people



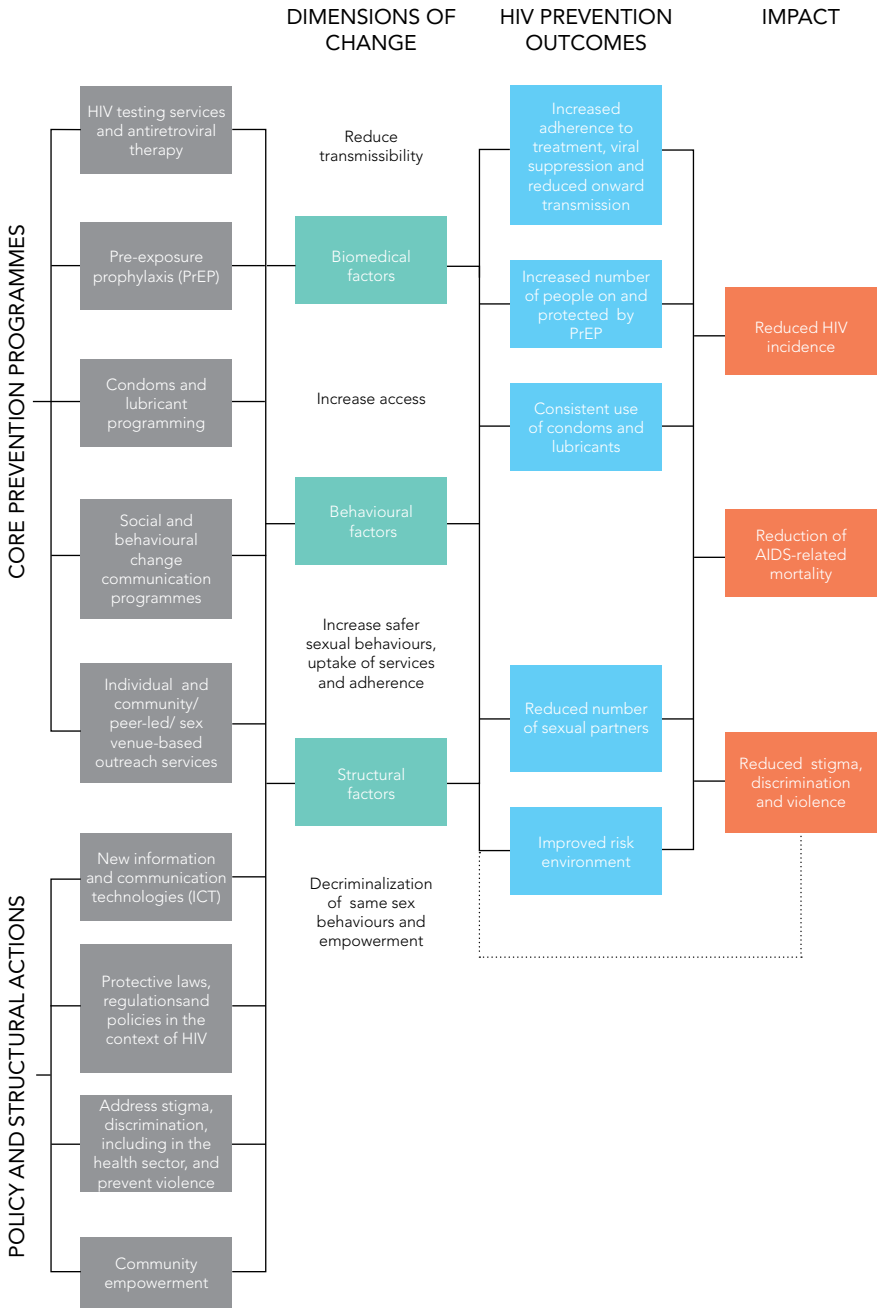
Detailed strategy mix for HIV prevention among people who inject drugs



Detailed strategy mix for HIV prevention among sex workers



Detailed strategy mix for HIV prevention among gay men and other men who have sex with men



Core prevention programmes

Condom programmes targeted at key populations: when used correctly and consistently, condoms are highly effective in preventing sexual transmission of HIV. Condom programmes must be tailored to effectively target each key population.

Pre-exposure prophylaxis (PrEP) is the latest addition to efforts to expand combination prevention options for people at high risk of HIV infection. PrEP empowers individuals with limited personal prevention options to discreetly take control of their own HIV risk. In some countries there appears to be high demand among men who have sex with men.

HIV testing can be a critical entry point because the counselling and testing process presents an opportunity for behaviour change communication and opens the pathway to treatment and care for people living with HIV.

HIV treatment not only is life-saving for the recipient but also helps protect the sexual partners of people from key populations from being infected. Combination programmes for key populations should include, where appropriate, access to pre- and post-exposure prophylaxis. Female sex workers and women who inject drugs also need access to services for prevention of mother-to-child transmission of HIV.

Information, education, communication: empowering members of key populations with the information they need to protect themselves is a key component of HIV prevention. This is typically best done through peer-to-peer networks and encompasses not only health but also legal issues and involvement in policy advocacy. Social media offers innovative ways to reach out to and engage with groups who are otherwise hard to reach.

Harm reduction: needle–syringe programmes, opiate substitution therapy and overdose prevention using naloxone are strong evidence-based services for people who inject drugs, including those in prisons and other closed settings. Other key populations also benefit from harm-reduction programmes for alcohol, drugs and other substance use.

Non-HIV health services such as prevention, screening and treatment for tuberculosis, hepatitis B and C, and sexually transmitted infections are valuable public health interventions in their own right, and can reinforce efforts to attract members of key populations to take up HIV prevention and testing services.

Trans-competent health services and peer-led outreach are essential to overcome the unique barriers preventing transgender people from accessing vital HIV prevention and treatment services. Widespread stigma, discrimination and denial of gender identity in mainstream health services deter transgender people from seeking services there. Peer-led outreach has been proven highly effective, but education and behaviour change communication with mainstream health-care workers are also very important.

Policy change and structural programmes

Empowerment of key population communities and the civil society organizations that represent their interests has enabled HIV policy-making to be informed and shaped by the people it aims to help.

Rights literacy, legal services, access to justice, and monitoring and reviewing discriminatory and other punitive laws: criminalization of sex work, drug use and sexual orientation, and denial of gender identity are structural barriers to the HIV response. Rather, laws should protect key populations, and key population communities need to be well-informed about what rights they do have and empowered to exercise them.

Stigma, discrimination and violence reduction: violence and other human rights violations are a fact of daily life for many key populations, and stigma impedes their ability to seek HIV and other services. Programmes addressing discrimination in health care and building human rights competencies of law enforcement workers are important interventions to reduce structural barriers that keep key populations away from services. Reducing violence, tackling discrimination wherever it is found, and overcoming the crippling effects of stigma are all key HIV interventions.

Closing the gaps

Comprehensive approaches produce results

Truly comprehensive programmes can reduce HIV incidence among key populations. However, few countries and cities have put them in place.

There is strong evidence that comprehensive programmes can reduce HIV incidence among key populations. Programmes that incorporate access to a range of medical care services, including PrEP, integrated HIV and sexually transmitted infection services, and rapid initiation of treatment for people diagnosed with HIV are reducing HIV infections among men who have sex with men in the American cities of San Francisco, Boston and Seattle *(25)*. In Boston, where men who have sex with men account for 64% of people living with HIV, new HIV infections among men declined by 31% between 2005 and 2013 *(26)*. In Seattle, where more than two thirds of residents diagnosed with HIV are men who have sex with men, the percentage of men who have sex with men accessing HIV testing services who tested positive for HIV declined from 2.8% to 1.8% between 2007 and 2014 *(27)*.

A comprehensive package of services for people who inject drugs, featuring harm reduction and an enabling legal environment, can produce dramatic results. In Portugal, depenalization of the purchase, possession and consumption of small amounts of narcotic drugs, and expansion of the availability of harm-reduction services, coincided with a 95% decrease in the number of people who inject drugs diagnosed with HIV over 10 years *(19)*.

Street children, particularly those who use drugs, are among the people most vulnerable to HIV and the hardest to reach. A multisectoral response in Saint Petersburg, Russian Federation, including social support and HIV prevention measures such as violence prevention, significantly reduced HIV infections among street children; HIV prevalence decreased by 73% between 2006 and 2012 *(28)*.

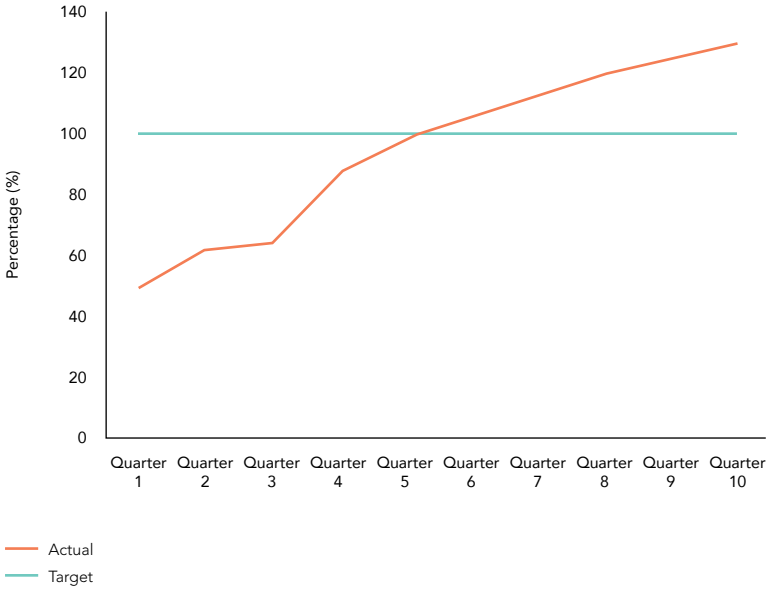
South Africa steps up for sex workers

HIV prevalence among female sex workers in Johannesburg, South Africa is 71.8% *(29)*. The South African Government tackled this challenge through a comprehensive HIV programme focused on sex workers that has inspired a national action plan specifically targeting sex workers' needs.

The Red Umbrella programme of the National AIDS Council of South Africa, implemented from October 2013 to March 2016, combined biobehavioural, social and structural interventions. The nationwide programme enlisted peer motivators to assist in the distribution of condoms and lubricant, information on sexually transmitted infections and HIV prevention, paralegal services and health service referrals. Community empowerment services that aim to reduce violence, stigma and discrimination included sensitization training and a helpline for sex workers. Red Umbrella exceeded its targets, reaching 34 638 sex workers with HIV testing services (129% of the target) *(30)*. Attitudes of health-care workers and law enforcement officers improved over the course of the programme, and the programme also fostered high levels of social cohesion and mutual support among sex workers.

As the programme drew to a close, the South African National Sex Worker HIV Plan 2016–2019 was launched. The Plan acknowledges that South Africa's drive to reduce

Rapid scale-up of HIV testing and counselling services for sex workers: the experience of the Red Umbrella Programme in South Africa, 2013–2016



Source: Networking HIV & AIDS Community of Southern Africa (NACOSA), 2016.

new HIV infections can succeed only if sex workers are no longer marginalized and stigmatized. It calls for a standard minimum package of services to be implemented by government and nongovernment providers. Sex workers will also be eligible for PrEP and universal test-and-treat services. There are three tiers of service delivery: dedicated clinics in areas with a high density of sex workers; mobile services delivered at sex work hotspots with support from outreach teams; and 1000 peer educators. Together they aim to provide services to approximately 70 000 sex workers *(29)*.

Zimbabwe is also in the process of developing a strategic action plan to guide the services for sex workers. As part of the United States President's Emergency Plan for AIDS Relief (PEPFAR) DREAMS initiative, nongovernmental organizations are supporting young women who sell sex in six districts to access services through the Sisters with a Voice programme. The programme includes community mobilization specifically tailored to young sex workers' needs, and referral to a range of services, such as educational grants, cash transfers, social protection and PrEP *(31)*.

Transgender HIV prevention innovations from Peru and India

Among key populations at higher risk of infection, transgender women have until recently been either ignored or subsumed within the response for men who have sex with men. Their HIV risk profile, needs and specific challenges are quite distinct, however, and can be addressed only with actions tailored specifically for them.

Until recently, Peru's national HIV programme did not recognize the country's 23 000 transgender women, although they have the highest HIV prevalence in the country. In the capital, Lima, HIV prevalence among transgender women is 30%, in contrast to 0.23% among the general population *(32)*. Biological and behavioural risks (receptive anal sex, transactional sex, high number of sexual partners, low condom use) and structural factors, such as a gender identity that is not legally recognized, drive high HIV incidence among transgender women. It is common for government security forces to perpetrate violence against transgender women, and the lack of protective laws exacerbates transgender women's social and structural exclusion *(32, 33)*.

In December 2014 the Ministry of Health in Peru committed to improve programming for transgender women. Policy dialogue between key stakeholders included the Ministry of Health, academia, civil society, transgender organizations and international agencies. The result was the Targeted Strategy Plan of STIs/HIV/AIDS Prevention and Comprehensive Care for Transwomen *(34)*. The plan stresses the importance of structural interventions and the engagement of community organizations and places particular emphasis on three key elements of strong planning for hard-to-reach populations: availability of relevant data, capacity-building for advocacy among transgender women, and active participatory policy dialogue.

In India, community engagement and strengthening are key elements of the Pehchan programme. With a grant from the Global Fund to Fight AIDS, Tuberculosis and

Malaria, the programme provided HIV, health, legal and social services to transgender communities across 18 Indian states through a rights-based empowerment approach *(35)*. A study quantifying the impact of the programme found that access to condoms increased by 12.5%. Condom use during last anal sex increased 18.1% with regular male partners and increased 8.1% with casual male partners. There was a 20.1% increase in access to HIV outreach education and testing and counselling, and even bigger increases in access to emergency crisis response (19.7%), legal support (26.8%) and mental health services (33.0%).

Taking full advantage of PrEP

PrEP has been shown to greatly reduce the risk of HIV infection among key populations. A study of men who have sex with men in the United Kingdom of Great Britain and Northern Ireland found PrEP reduced HIV incidence by 86% *(36)*. Low adherence erodes effectiveness, however. A demonstration project among adolescent men aged 15–17 years who have sex with men found that adherence dropped off considerably after study visits changed from monthly to quarterly, suggesting that young people on PrEP would benefit from more intensive support compared with their older participants *(37)*.

PrEP greatly reduces HIV risk among key populations, but it is not a "magic bullet"; PrEP must be used alongside programmes such as condom distribution, treatment for sexually transmitted infections and the removal of structural barriers.

The study emphasizes that PrEP should not be taken as a "magic bullet"; PrEP must be used alongside other programmes, including condom distribution, education, treatment for sexually transmitted infections, and programmes aimed at removing structural barriers such as punitive laws, stigma, discrimination and police abuse. For sex workers, there are fears that PrEPcould be seen by their clients as an alternative to condoms *(38)*. PrEP also requires regular HIV testing as it cannot be taken safely by people living with HIV; this is a challenge in settings where HIV testing is not easily and freely available to key populations, or where stigma and discrimination in health-care settings keep people away from testing services. PrEP also increases the medicalization of HIV prevention, which places extra demands on both the health system and the individual.

Bringing the data together: the Key Populations Atlas

Knowing which programmes can drive the end of AIDS is only one step. The next step is to know exactly where those interventions should be deployed. The UNAIDS Key Populations Atlas is the largest single visualization tool dedicated to displaying HIV-relevant data describing the epidemic and response among five key populations: men who have sex with men, sex workers, people who inject drugs, transgender people and people in prison *(18)*.

The Atlas brings together epidemiological, behavioural, structural and programmatic data about the HIV epidemic and response at subnational levels. It is the first effort to aggregate these data in a way that can be used by both public health professionals and community advocates. The distribution of data, the assessment of quality of the

Geospatial data visualization in the UNAIDS Key Populations Atlas

The UNAIDS Key Populations Atlas is the largest single visualization tool dedicated to displaying HIV-relevant data describing the epidemic and response among five key populations.

data, and the ability to layer structural determinants (e.g. resources, laws, stigma and discrimination) with epidemiological data provide policy-makers with a holistic picture of a country's key populations. The Atlas shows were data are available, shows where gaps exists, and reveals crucial details not reflected in national-level data. For example, in Ethiopia the reported national prevalence of HIV among sex workers is 24%, but subnational data from seven sites show wide variation, from 13% to 32%. Such data are especially useful when local programme planners do not have access to geographical information system tools. In addition, community advocates can use the tool to call for equity in service access.

In the near future the Atlas will incorporate subnational data from programmes outside global AIDS monitoring reporting for a large number of localities, and the legal database will be expanded.

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Finding solutions for everyone at every stage of life

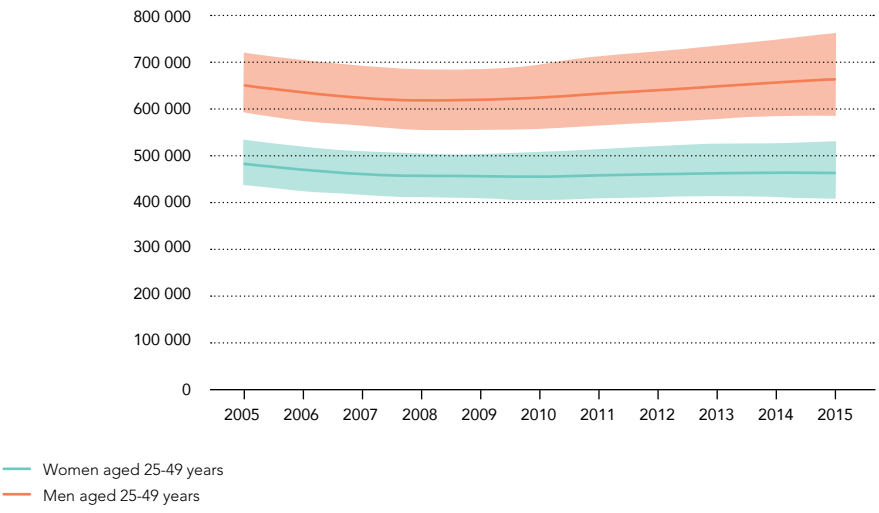
25–49

Progress and gaps

Across the life cycle, the absolute risk of HIV infection often peaks in adulthood (ages 25–49), especially among men. This can be seen in the 2010–2014 data of longitudinal studies conducted in eastern and southern Africa. Among all cohorts, the risk of HIV infection peaked after age 25 years, and 50% of new infections among men were in men aged 30–49 years *(1)*.

Efforts to reduce new infections among adults have struggled. The annual number of new infections among adults aged 25–49 years globally has remained essentially flat.

New HIV infections among men and women (aged 25–49 years), global, 2005–2015



Source: UNAIDS 2016 estimates.

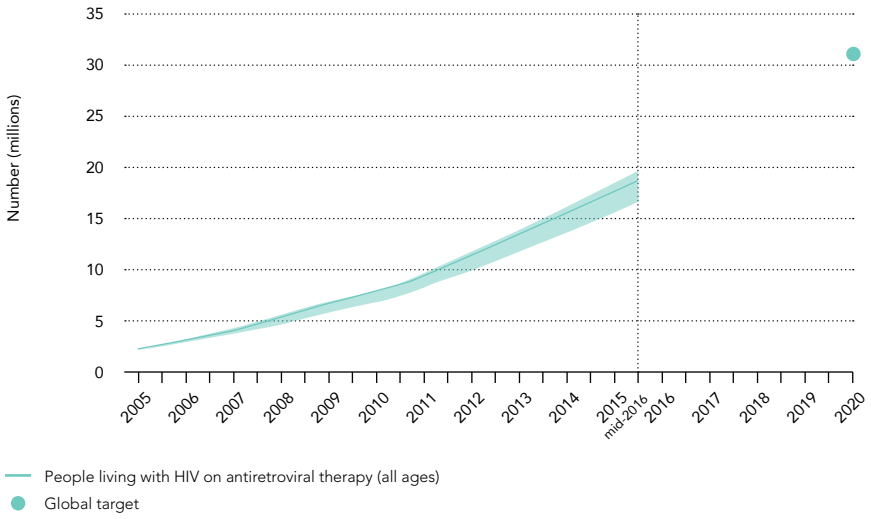
Efforts to reduce new infections among adults have struggled in recent years. After a decade of steady decreases, the annual number of new infections among both men and women aged 25–49 years globally has remained essentially flat. This lack of progress reflects the failure of many countries to put in place comprehensive HIV prevention programmes that provide a range of service options and address well-recognized structural barriers.

Despite these struggles, game-changing evidence of the strong preventive effect of antiretroviral therapy published in 2011 helped stimulate ambitions to end AIDS as a public health threat by 2030. Since then, the 90–90–90 targets, launched by UNAIDS at the 2014 International AIDS Conference, have focused global efforts on a set of measurable targets to be achieved by 2020: 90% of people living with HIV know their

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

Considerable progress has been achieved against the second of the three "90s". The number of people living with HIV (all ages) accessing antiretroviral therapy continued to increase during the first half of 2016, reaching 18.2 million [16.1 million–19.0 million] globally, and the rate of scale-up appears on track to achieve the target of 30 million people by 2020. Efforts to remain on this trajectory are threatened, however, by

People living with HIV on antiretroviral therapy, all ages, global, 2010–July 2016



Source: Global AIDS Response Progress Reporting, 2016; UNAIDS 2016 estimates.

Treatment scale-up appears on track. However, efforts to hit the 2020 target are threatened by insufficient knowledge of HIV status among people living with HIV.

considerable challenges that stand in the way of achieving the first and third "90s". At the end of 2015, only 60% [56–65%] of people living with HIV knew their HIV status. In addition, far too few people living with HIV have achieved viral suppression—only 38% [35–41%] at the end of 2015, roughly half of the 73% required to achieve the third "90" and realize the prevention dividend of treatment.

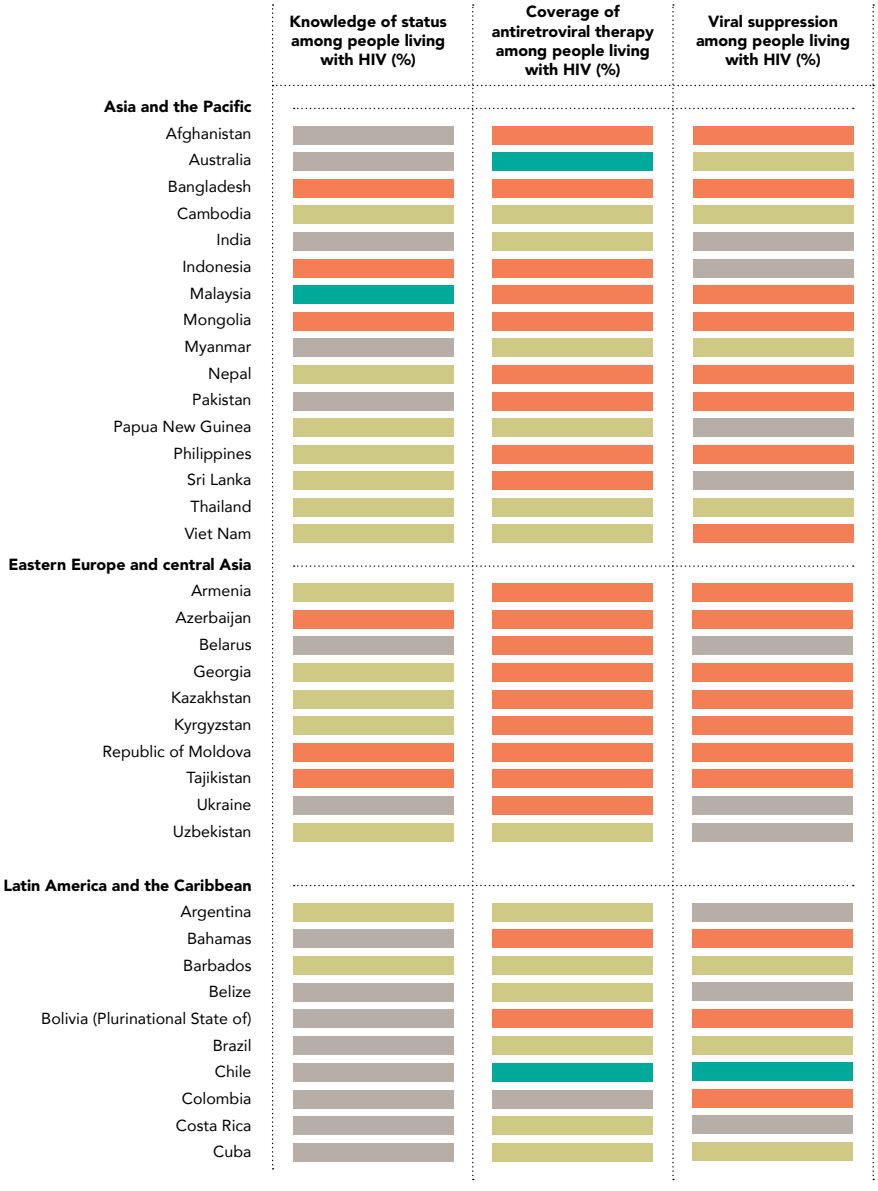
Country status

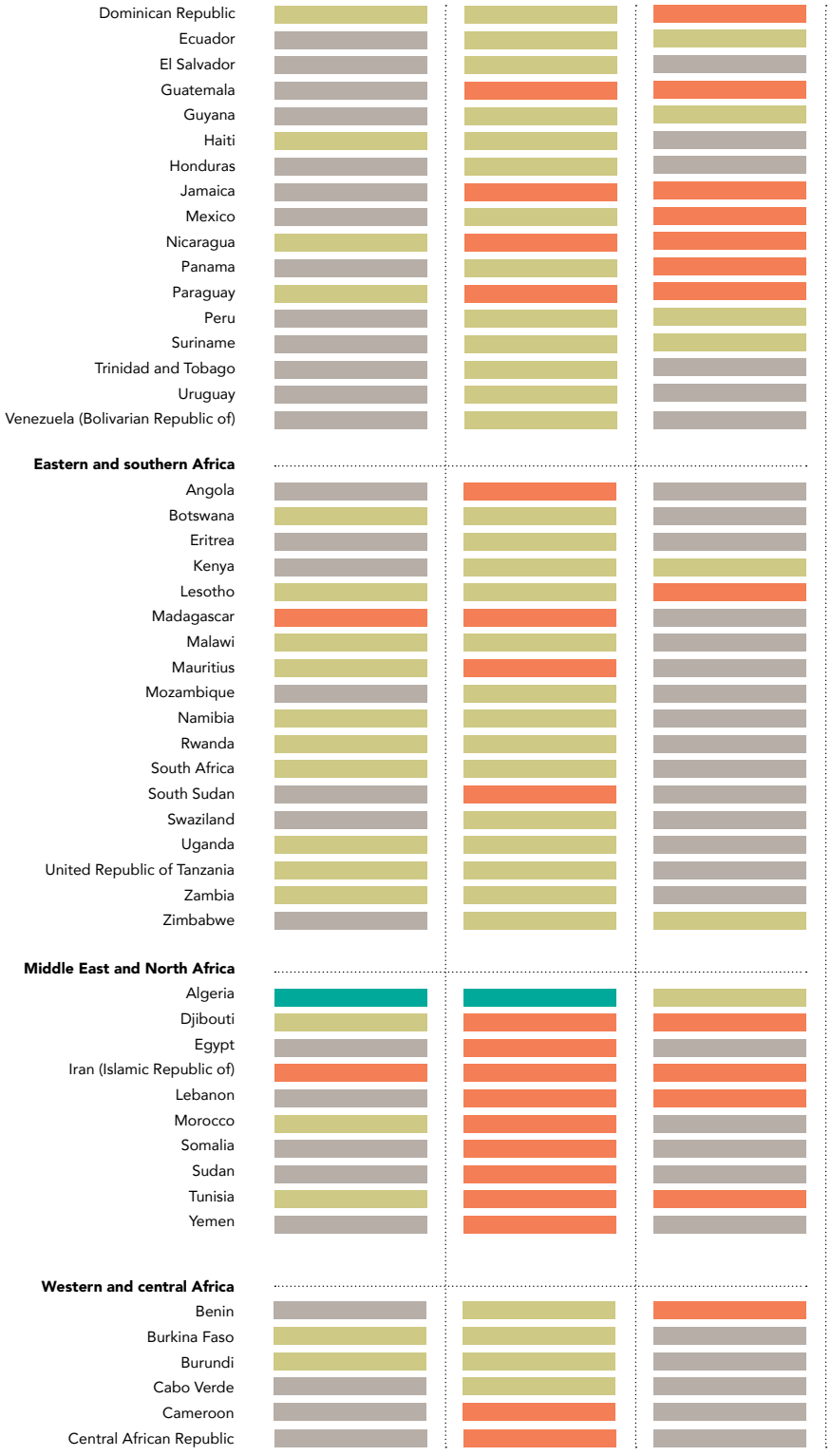
Progress towards the 90–90–90 targets is uneven across regions and countries. Country data on the first "90" are sparse in most regions. Headway on the second "90", which translates to 81% of people living with HIV on antiretroviral therapy, is strongest in western and central Europe, eastern and southern Africa, Latin America and the

Caribbean. Very few of the countries in these regions with available data appear on track to achieve the third "90", however, which translates to 73% of people living with HIV virally suppressed.

Of particular concern is western and central Africa, where available data suggest that few countries are on track to achieve the first two "90s", and none appears on track to achieve the third "90". Poor treatment coverage in the region is driving high levels of mortality—30% of the world's AIDS-related deaths in 2015 occurred in the region, which is home to 18% of people living with HIV globally.

Progress toward the 90–90–90 targets, all ages, by country, 2015




Dominican Republic
Ecuador
El Salvador
Guatemala
Guyana
Haiti
Honduras
Jamaica
Mexico
Nicaragua
Panama
Paraguay
Peru
Suriname
Trinidad and Tobago
Uruguay
Venezuela (Bolivarian Republic of)
Eastern and southern Africa
Angola
Botswana
Eritrea
Kenya
Lesotho
Madagascar
Malawi
Mauritius
Mozambique
Namibia
Rwanda
South Africa
South Sudan
Swaziland
Uganda
United Republic of Tanzania
Zambia
Zimbabwe
Middle East and North Africa
Algeria
Djibouti
Egypt
Iran (Islamic Republic of)
Lebanon
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Tunisia
Yemen
Western and central Africa
Benin
Burkina Faso
Burundi
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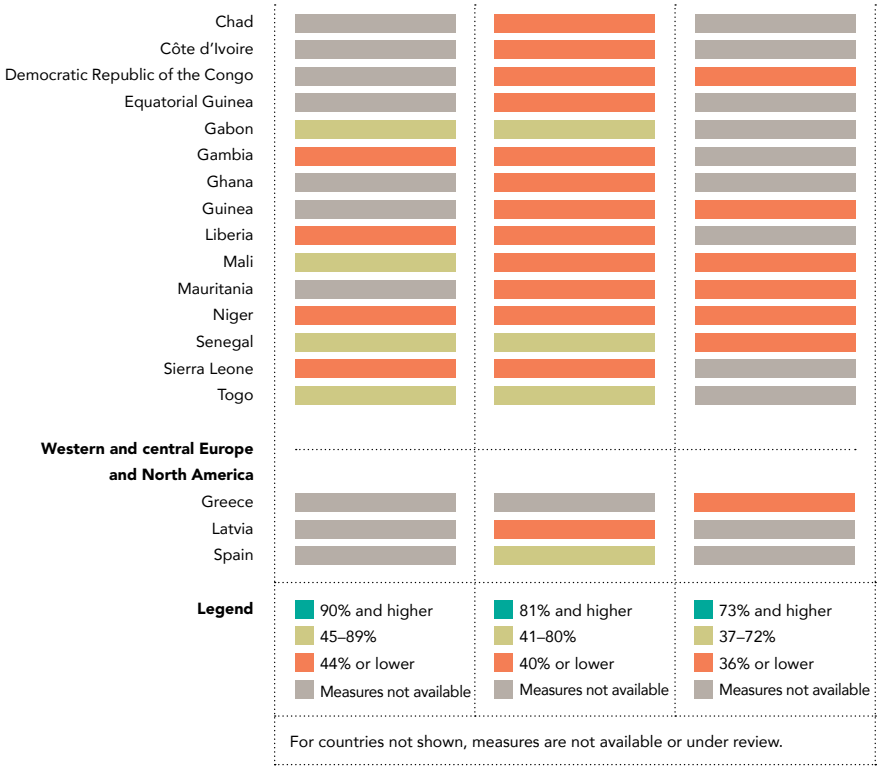


Source: 2016 Global AIDS Response Progress Reporting; UNAIDS 2016 estimates.

Key challenges

HIV programmes failing to engage men

Men generally enjoy more opportunities, privileges and power than women. Health outcomes among boys and men in most parts of the world, however, are substantially worse than among girls and women *(2)*. Much of this gender disparity appears due to behaviours associated with masculinity and male norms of risk-taking and adventure—including excessive alcohol use—and greater reluctance to seek medical care when they are ill *(2, 3)*. By contrast, women tend to increase their use of health services during their reproductive years *(4)*, when HIV risk is highest.

The same value systems and norms of masculinity that discourage men and boys from accessing health services have been shown to be powerful barriers to HIV services in a diversity of settings *(5, 6)*. Several studies conducted in eastern and southern Africa suggest that notions of masculinity increase the risk of HIV infection and also inhibit men from getting tested for HIV *(2)*. Voluntary medical male circumcision programmes are important entrypoints for addressing these issues.

Late diagnosis and treatment initiation, especially among men

Late diagnosis and treatment initiation among men have serious implications for both HIV prevention and treatment outcomes.

The quicker a person living with HIV is diagnosed and initiates treatment, the quicker his or her viral load can be reduced to levels that nearly eliminate the risk of onward transmission of the virus. By contrast, late diagnosis and treatment initiation have serious implications for both HIV prevention and treatment outcomes and are a particular challenge among adult men. A gender gap in awareness of HIV status can be seen in population-based surveys. In 21 countries where HIV tests were included within Demographic and Health Surveys conducted between 2011 and 2015, 59% of men living with HIV aged 15–49 years reported they had previously been tested for HIV and received the results, compared with 72% of women in the same age range. In 12 countries of western and central Africa, just 37% of men living with HIV and 52% of women living with HIV reported they had previously been tested and received the results.

Percentage of people living with HIV (aged 15–49 years) who have ever been tested for HIV and received the results, men and women, 21 countries, 2011–2015

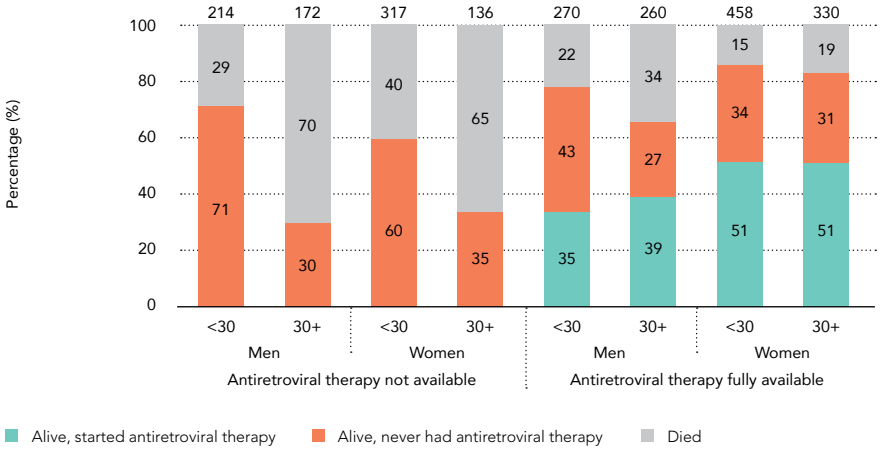
Source: Demographic and Health Surveys, 2011–2015.
*Includes Dominican Republic and Haiti.

Men living with HIV are also less likely than women living with HIV to access treatment, according to an analysis of patient records from more than 765 000 adults on antiretroviral therapy in 12 low- and middle-income countries between 2002 and 2013 *(7)*. In seven of these countries, the gender-related disparities appeared to increase over time.

Longitudinal surveys conducted in three communities across eastern Africa reveal additional insights. In the years before antiretroviral therapy was available in these communities, the percentages of men and women living with HIV who died within 10 years of infection were essentially the same (48%) *(1)*.

After treatment became fully available, however, the percentage of men living with HIV who were alive and on treatment up to 10 years after infection was considerably lower, and deaths among men were much higher, compared with women. Among people living with HIV aged under 30 years, 51% of women were on treatment compared with 35% of men; among people living with HIV over age 30 years, 19% of women had died within 10 years of infection, compared with 34% of men *(1)*.

Comparison of men and women 10 years after HIV infection, before and after the availability of antiretroviral therapy, three locations in southern Africa



Source: Network for Analysis of Longitudinal Population-based HIV/AIDS data on Africa (ALPHA), 2016.

Across seven years (2006–2012), men living with HIV within these cohorts had longer gaps between infection and diagnosis and between infection and initiation of treatment, compared with women. As a result, men living with HIV were more likely than women to die before starting antiretroviral therapy. Death rates among adults who initiated treatment were also higher among men compared with women *(8)*.

The implications for HIV prevention can be seen within the HIV transmission cycle revealed by the CAPRISA phylogenetic study in KwaZulu-Natal, South Africa. Among the men living with HIV in the phylogenetically linked clusters, only 26% were aware of their HIV status, only 5% were on treatment, and the median viral load was extremely high *(9)*.

Poor adherence, drug resistance and treatment failure

HIV drug resistance is an increasing concern for both individual patients and national treatment programmes. People living with HIV must carefully adhere to antiretroviral medications to reduce viral load to undetectable levels, protect their immune system and reduce the possibility of drug-resistant strains of HIV developing within their bodies. Even when a medication is the difference between life and death, the difficulty of regularly taking sometimes complicated daily doses is apparent in the data: a 2011 meta-analysis of 84 studies on adherence conducted in 20 countries found that an average of 62% of patients reported adhering to at least 90% of their prescribed doses *(10)*.

When drug-resistant strains of HIV are transmitted to other people, larger percentages of people come under threat of treatment failure, requiring greater amounts of costly second- and third-line antiretroviral regimens. As antiretroviral therapy continues to expand and the average duration of treatment increases, both the absolute number and the relative proportion of people needing second-line therapy grows *(11)*. In a cohort study of nearly 300 000 people in 16 countries of sub-Saharan Africa, about 1.6 in every 100 people on antiretroviral therapy switched to second-line regiments each year, and overall 7.9% of patients were on second-line treatments after 5 years *(12)*. A recent modelling of future treatment needs for sub-Saharan Africa found that achieving rapid scale-up of treatment would require up to 3 million people in the region to be on second-line therapy in 2020 (12% of patients) and up to 4.6 million on second-line therapy in 2030 (18% of patients) *(13)*.

People living with HIV accounted for 1.2 million of all new tuberculosis cases in 2015, 11% of the global total.

Tuberculosis and people living with HIV

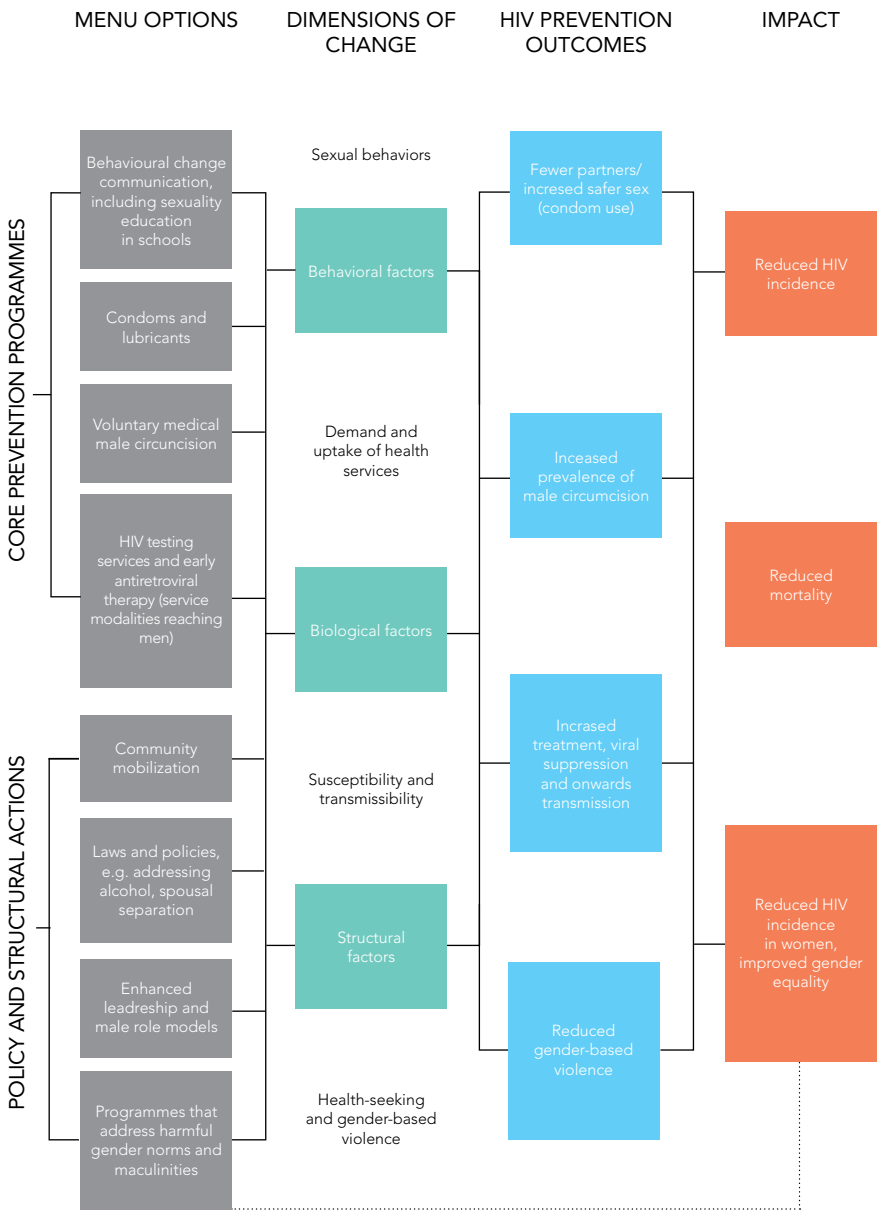
Tuberculosis (TB) risk increases immediately after HIV infection, and TB disease is often the first illness that causes people living with HIV to seek healthcare. Routine offer of HIV testing is recommended for all people with TB symptoms and for all people diagnosed with TB disease, and those who test positive for HIV should immediately initiate antiretroviral therapy.

Globally, there has been impressive progress. In 2015, 55% of the 6.1 million new TB cases notified to national TB programmes had documented HIV test results, an 18-fold increase since 2004 *(14)*. In the African region, where the burden of HIV-associated TB is highest, 81% of TB patients had a documented HIV test result *(14)*. Antiretroviral therapy among TB patients known to be living with HIV was 78% globally, and above 90% in India, Kenya, Malawi, Mozambique, Namibia and Swaziland *(14)*.

Despite this progress, people living with HIV accounted for 1.2 million of all new tuberculosis cases in 2015, 11% of the global total, and 400 000 deaths among people living with HIV resulted from TB disease *(14)*. Mounting cases of drug-resistant TB—an estimated 580 000 additional people required treatment for multi-drug-resistant TB in 2015 *(14)*—is a particular challenge. People living with HIV who need treatment for drug-resistant TB are exposed to an increased risk of drug interactions and side-effects from the potentially toxic combination of antiretroviral medicines with second- and third-line anti-TB medicines.

A comprehensive approach

Detailed strategy mix for HIV prevention among adolescent boys and adult men in high-prevalence settings—a menu of options



Core prevention programmes

Behavioural change communication on HIV should include messaging that equips men and boys with the knowledge, skills, attitudes and values that will enable them to abandon harmful gender norms and develop a positive view of their sexuality in the context of their emotional and social development.

Condoms and lubricant: when used consistently and correctly, condoms are highly effective in preventing the sexual transmission of HIV.

Voluntary medical male circumcision is a cost-effective, one-time intervention that provides lifelong partial protection against female-to-male HIV transmission.

HIV testing services and immediate antiretroviral therapy: HIV testing is a critical entry point for both HIV prevention and treatment initiation. Realizing the population-level prevention effects of antiretroviral therapy will require particular modalities that address the typically late diagnosis and treatment initiation among men.

Policy change and structural programmes

Community mobilization is a process that helps communities identify, respond to and address their needs. Community mobilization and participation have made substantial contributions to HIV prevention. In practice, community mobilization approaches are often implemented through the same channels and organizations as, and complement, social and behavioural change communication programmes.

Policy and legal changes: supportive policies include those that increase equality in sexual relations, particularly in decision-making around sex; promote responsible male behaviour; enforce measures to end violence against women; emphasize men's participation in HIV testing, reproductive and child health, and family health; and support men as caregivers *(15)*.

Enhanced leadership and male role models: leadership involvement in development programmes is commonly applied as a strategy to build ownership and improve community understanding, thus opening the way towards sustainability. For HIV prevention in high-prevalence locations, leaders can serve as role models for how men engage and interact with women.

Programmes that address harmful gender norms and masculinities: gender-transformative interventions can increase protective sexual behaviours, prevent partner violence, modify inequitable attitudes, and reduce transmission of HIV and other sexually transmitted infections *(16)*.

Closing the gaps

Expanding HIV testing options

Assisted partner notification and self-test kits have been shown increase access to HIV testing among men.

Reaching the first "90" (90% of all people living with HIV aware of their HIV status by 2020) requires expansion of HIV testing options. Self-testing kits are both discreet and convenient for people who may be reluctant to take a test at a health facility or who live in places where health facilities are inaccessible. Self-testing options have been proven to be both feasible and acceptable in settings ranging from rural areas of Zimbabwe *(17)* to large cities in China *(18)*. In Kenya, where population-based surveys have suggested that the willingness to use self-test kits is high, researchers gave self-test kits to pregnant women during their first antenatal clinic visit and asked the women to give the kits and instruction materials to their male partners. Control groups were given invitation letters requesting men come to the antenatal clinic for a standard HIV test. Eighty-three per cent of men who received the self-test kit reported using it, and about half reported taking an HIV confirmatory test at a health facility, compared with 28% and 37% of men in the two control groups *(19)*. The study demonstrated that self-test kits can be used to increase access to HIV testing among men and help reduce mother-to-child transmission of HIV.

Assisted partner notification, whereby health-care providers contact the sexual partners of people diagnosed with HIV and offer counselling and testing, is also showing positive results in low-income settings. In a study in Cameroon, health advisors successfully notified 1347 partners of more than 1400 people living with HIV, of whom 900 were tested, 451 were found to be living with HIV and 386 were enrolled in HIV medical care *(20)*. A similar pilot conducted at a clinic in Maputo, Mozambique, identified large numbers of undiagnosed people living with HIV *(21)*. Both studies found that assisted partner notification was acceptable to the participants; the Maputo study found that it posed a low risk of adverse events, such as violent reactions by the sexual partners who are notified. In Kenya, electronic patient intake forms and geospatial technology have been used to augment assisted partner services *(22)*.

Simplifying treatment regimens

Greater treatment adherence rates can be achieved through the adoption of simpler regimens *(23,24)*. Once-daily single-pill regimens can up to double strong treatment adherence rates compared with multi-tablet regimens, improve therapeutic outcomes and achieve health-care cost efficiencies *(25)*. On the cutting edge of efforts to further simplify antiretroviral therapy for patients is the development of injectable medicines that are administered monthly or every two months. Initial results from a trial of four- and eight-week injections of two antiretroviral drugs, cabotegravir and rilpivirine, have showed promising results, and four-week injections are expected to progress to phase III trials

(26). Patients involved in the trial expressed a preference for injectable antiviral medicines compared with daily pills, despite some side-effects such as temporary soreness at the injection site. As well as greater convenience and easier adherence for monthly doses, some patients reported that injections helped them manage HIV-related stigma because monthly injections were more discreet and reduced the risk of unintended disclosure of their HIV-positive status *(27)*.

Expanding viral load monitoring

Up to 70% of switches to second-line treatment may have been unnecessary. Viral load tests are more likely to detect treatment failure early, providing an opportunity to undergo enhanced adherence support before switching.

Compared with CD4 tests that are more commonly available in low- and middle-income countries, viral load tests are more likely to detect treatment failure early, providing an opportunity to undergo enhanced adherence support, or, if adherence problems are ruled out, to ensure prompt and correct switching to second- and third-line treatment regimens. Lower AIDS-related mortality rates in South Africa, compared with Malawi and Zambia, have been attributed to South Africa's scale-up of viral load testing *(28)*.

Many countries have been slow to make the change to viral load testing due to the costs involved; but in the longer term, the expansion of viral load testing should yield cost savings and better treatment outcomes. A study conducted in six African countries found that almost half of patients who changed to a second-line regimen on the basis of only clinical or CD4 monitoring were switched unnecessarily *(29)*. Another multi-country study conducted by Médecins Sans Frontières found that only 30% of people suspected of treatment failure had an elevated viral load, meaning that 70% might have been switched to second-line treatment unnecessarily if viral load was not used to confirm treatment failure *(30)*. Avoiding these unnecessary switches means keeping people on more affordable first-line regimens and paying greater attention to other issues, such as poor adherence, that may be affecting a particular patient's health.

The costs of viral load tests are expected to decrease as volume increases, and the ongoing development of point-of-care viral load testing platforms offers the prospect of simpler, more cost-effective and patient-friendly approaches in the future *(31)*. Point-of-care testing allows faster return of test results, enabling clinicians to identify and address adherence challenges and treatment failure more quickly.

The benefits of viral load testing can be maximized when it is rolled out alongside other evidence-informed strategies for improving treatment adherence, such as peer support groups. A recent study found that measuring viral load at 3 months after treatment initiation, combined with an adherence intervention, reduced the risk of virological failure by 22%, compared with monitoring viral load 6 months after starting therapy *(32)*. In Mozambique, self-formed community antiretroviral therapy groups are associated with high rates of linkage to care and superior coverage for viral load testing *(33)*.

TB prevention and intensified TB case finding

TB prevention, early diagnosis of TB and early initiation of TB and HIV treatments for people living with HIV are all essential to ending AIDS and TB by 2030. Key prevention interventions include TB preventive therapy and preventing person-to-person spread of TB through infection control activities. In 2015, more than 900 000 people living with HIV were started on TB preventive treatment, a large increase from the negligible levels in 2005 *(14)*. South Africa accounted for the largest share (45%) of this total, followed by Malawi, Mozambique and Kenya *(14)*. Serious gaps remain: of the 30 countries with the highest burden of HIV-related TB, 21 did not report any provision of preventive treatment in 2015.

Because TB is often difficult to diagnose in people living with HIV, extra effort—known as intensified TB case finding—is needed. Screening for TB symptoms should be conducted among people living with HIV at every opportunity. When people living with HIV have TB symptoms, screening should be followed up with an accurate TB test. The World Health Organization recommends the use of Xpert MTB/Rif to diagnose TB among people living with HIV *(14)*. The majority of countries with high burdens of HIV-related TB endorse this recommendation. However, access to Xpert MTB/Rif testing remains limited for many people living with HIV. Joint investment by both national TB and HIV programmes is needed to scale up the use of Xpert MTB/Rif, which has the added benefit of rapid detection of Rifampicin resistance.

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Finding solutions for everyone at every stage of life

50+

ageing (50+)

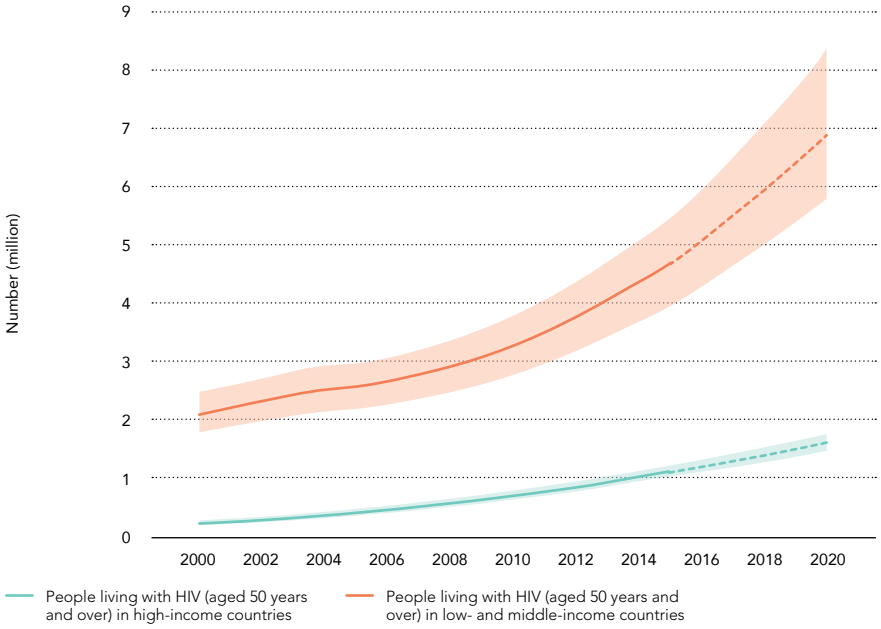
Progress and gaps

Far from being the death sentence that HIV once was, when treatment is available HIV has become a manageable chronic disease. Many people who acquired HIV in their thirties and forties are now living into their sixties and beyond *(1)*. Added to this, people who acquire HIV in middle age account for a significant proportion of new infections *(2)*. The result is that there are more people than ever aged 50 years and over who are living with HIV.

Globally, 17% of adults (people aged 15 years and over) living with HIV are aged 50 years and over. Sustained high coverage of antiretroviral therapy in high-income countries has seen the percentage of adults living with HIV aged 50 years and over climb to 31%, up from 25% in 2010. In low- and middle-income countries, where treatment coverage is lower, people aged 50 years and over account for 15% of adults living with HIV, up from 12% in 2010.

If global treatment targets are reached, the number of people aged 50 years and over living with HIV in low- and middle-income countries is expected to soar from an estimated 4.7 million [4.4 million–5.1 million] to 6.9 million [5.8 million–8.5 million] people in 2020—a 47% increase.

Number of people living with HIV (aged 50 years and over), high-income countries and low- and middle-income countries, 2000–2015 and projected to 2020



Source: UNAIDS 2016 estimates.
Notes: Projections 2016–2020 are based on an assumption that scale up of antiretroviral treatment will reach 81% coverage of all people living with HIV by 2020. Country income classifications are from 2015.

Despite their higher mortality rates, men account for a higher proportion of older adults living with HIV. In 2015 there were an estimated 3.3 million [3.0 million–3.5 million] men and 2.5 million [2.3 million–2.7 million] women aged 50 years and over living with HIV. This is due in part to higher rates of HIV infection among older men compared with older women. An estimated 120 000 [110 000–140 000] people aged 50 years and over acquired HIV in 2015 globally, of whom 58% were men.

Sub-Saharan Africa accounted for 67% of new HIV infections among people aged 50 years and over in 2015. Longitudinal survey data show that men and women aged 50 years and older accounted for 11% of new HIV infections in three locations in eastern Africa and 5% of new HIV infections in six locations in southern Africa *(3)*. Studies show that people aged 50 years and over are less likely to have been tested for HIV and are less likely than their younger counterparts to have talked to their partners about HIV *(4)*.

Key challenges

Many people who acquired HIV in their thirties and forties are now living into their sixties and beyond thanks to the scale up of antiretroviral therapy. If global treatment targets are reached, the number of people aged 50 years and over living with HIV in low- and middle-income countries is expected to increase by 47%.

The long-term complications of antiretroviral medications, lifestyle and age-related diseases create substantial health challenges for older people living with HIV *(5)*. Ensuring they get the holistic treatment and care they need is critical to maintaining their health and well-being.

Lifelong HIV treatment brings its own complications

As people living with HIV get older, they are more susceptible to the adverse effects of antiretroviral therapy and must increasingly manage long-term side-effects. They are also more likely to take antiretroviral medication in combination with other medications. While adherence to HIV treatment among older people appears better than that among younger people, dealing with multiple medical conditions poses an increased risk of non-adherence to HIV treatment and complications with medication interactions, threatening the efficacy of antiretroviral therapy overall *(2,6)*. Antiretroviral drug resistance poses a significant threat to people who have been living with HIV for a significant number of years, and to the health systems that support them. Both the development of resistance within an individual and the spread of drug-resistant strains within the population may reduce the effectiveness of treatment and undermine efforts to reduce AIDS-related deaths *(7)*.

Older people living with HIV face particular health concerns

As people living with HIV grow older, they are at increased risk of developing age-associated noncommunicable diseases, which may worsen HIV disease progression *(8, 9)*. Ageing alone results in increased susceptibility to secondary infections and a delayed immune response, and this may be accelerated in people living with HIV *(10)*. In addition, research from high-income countries shows that people living with HIV may

have up to five times the risk of chronic disease, notably cardiovascular disease, geriatric syndromes and co-morbidity—even among people who have consistently sustained viral suppression *(11, 12)*.

Moreover, high rates of smoking among people living with HIV (as high as 60% in one large-scale study of people living with HIV in the United States of America and Europe) also have a significant impact on health. Indeed, people living with HIV and receiving treatment may lose more life-years through smoking than through HIV, and mortality associated with smoking increases markedly with age *(13)*.

People living with HIV may have up to five times the risk of chronic disease, notably cardiovascular disease, geriatric syndromes and comorbidity.

Depression is common in people living with HIV, with prevalence rates up to three times higher than in the general population *(14)*. In a large study of people aged 50 years and over living with HIV, 39% showed symptoms of major depression *(15)*. HIV-associated stigma, increased loneliness, reduced levels of energy and decreased cognitive functioning have all been linked to depression among people living with HIV *(16)*, and this is particularly so for older adults *(15)*.

Women and key populations face even more difficulties

Women living with HIV face specific health challenges as they grow older. They appear to lose ovarian function earlier in life than women without HIV infection, and they are also at increased risk of developing chronic age-related disease such as cardiovascular disease and impaired cognitive function *(17, 18)*. Menopause aggravates the ageing process in women, and postmenopausal women are at greater risk of complications than men since the loss of sex hormones contributes to impaired immune function and overall age-related deterioration *(18)*. Clinicians require more information on how menopause interacts with HIV infection so they can provide appropriate care to women living with HIV during the menopausal transition *(17)*. Studies also show that older women living with HIV are profoundly affected by self-stigma *(19)*.

Just like younger people living with HIV, their older counterparts are characterized by great diversity, and there is no typical older person living with HIV *(20)*. They are men and women, heterosexual and homosexual, some are transgender, some sell sex, some buy sex, some use drugs, and some are in prison or other closed settings. As such, they have different needs and different challenges. Ageing adults within key populations face significant social, psychological and physical challenges associated with the ageing process *(15)*. The mental and physical health of lesbian, gay, bisexual and transgender people is poorer than that of their heterosexual counterparts, with associated consequences for higher rates of disease susceptibility later in life, including cardiovascular disease and obesity *(21)*. As transgender people age, they report higher rates of disability, general poor health, depression, anxiety, loneliness and suicidal ideation. Many transgender elders enter their later years with severe health concerns and yet without the social and community supports necessary to address them *(22)*.

Critical risks, services and strategic information for people living with HIV aged 50 and over

Risks	Age-appropriate HIV services	Other health care services	Strategic information
• Cardiovascular diseases • Frailty • Depression • Smoking	• Antiretroviral therapy • HIV prevention and harm reduction • Gender-responsive sexual health care	• Dietary counselling and support • Nutrition assessment • Smoking cessation • Exercise promotion • Blood-pressure monitoring • Cholesterol management • Mental health care • Palliative care	• Research on ageing with HIV • Improved epidemiological data on HIV in people aged over 50 years • Improved understanding of HIV incidence among people aged over 50 years

Closing the gaps

Leverage the wisdom and knowledge of older people living with HIV

Although ageing brings its own unique challenges, it also brings experience and wisdom that can be leveraged for both individual and wider community health and well-being. In a 2011 study among older people living with HIV, the strength and resilience required to live with HIV were identified as common positive traits that emerged from self-acceptance, the will to live, optimism, independence and self-management strategies *(23)*. Engaging with older adults living with HIV, sharing practical coping from peers, and enabling young people to benefit from the wisdom and knowledge of older people living with HIV all have immense potential benefits. Involving older people living with HIV in research, advocacy and programme development also contributes to innovation.

Several countries have included older people within national strategies and policies on HIV, or incorporated HIV into national ageing plans and policies. These approaches need to be adopted more widely. HIV issues among older Americans have been highlighted in the Office of National AIDS Policy within the White House Domestic Policy Council. In addition, the National Institutes for Health have initiated a research programme that includes collecting evidence on mechanisms and triggers of functional decline, intervention research and societal infrastructure, mental health and substance abuse issues *(24)*. HIV prevention is also on the agenda of the United States' association of retired people, AARP *(25)*.

In Ethiopia older people are identified as an important group, both as beneficiaries and contributors, within the Strategic Framework for the National Response to HIV/AIDS *(4)*. Similarly, in Thailand, the 10th National AIDS Plan (2007–2011) included older people as a specific target group for interventions. HIV was addressed in the 2003 Policy for the Elderly in Cambodia, in the United Republic of Tanzania's 2003 National

Ageing Policy, and in the South Africa Older Persons Policy of 2006. In Kenya, the National Policy on Older Persons and Ageing of 2009 refers to HIV, and people aged 50–64 years are included in the Kenya National AIDS Strategic Plan. Some national surveys are now including HIV infection data for people aged 50 years and over, including the AIDS Indicator Surveys in Botswana, Kenya and Mozambique, and the population-based HIV impact assessments supported by the United States President's Emergency Plan for AIDS Relief (PEPFAR) being conducted in several countries of eastern and southern Africa *(26)*.

Adapt health care to the needs of older people living with HIV

The wisdom and knowledge of older adults living with HIV have immense potential benefits. Involving older people living with HIV in research, advocacy and programme development contributes to innovation.

Given that people aged 50 years and over living with HIV are at increased risk of developing a wide range of noncommunicable diseases, their health management needs are complex; however, health-care systems in regions that are home to most people living with HIV were designed to primarily address acute, not chronic, care *(11)*. To provide cost-effective, efficient and comprehensive chronic care, greater integration of HIV services using a life-cycle-of-care approach is needed, including integration with services for noncommunicable diseases, sexually transmitted infections, broader sexual and reproductive health, substance use disorders, mental health, hepatitis, tuberculosis, blood safety, geriatric care and gender-based violence *(20)*. This will require training HIV-related health-care providers on geriatric care, and training geriatric providers on HIV-related care. The relatively well-developed HIV delivery systems in many low- and middle-income countries offer some unique and important opportunities for the integration of noncommunicable disease services *(27)*.

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conclusion

Advances towards vaccines and a cure

Vaccines are among the greatest public health innovations over the past 100 years. Routine childhood immunization has made previously common, often fatal diseases such as diphtheria, tetanus and whooping cough rarities in the twenty-first century. Recent successes include the elimination of measles from the Americas and the reduction in cases of poliomyelitis from hundreds of thousands per year globally to only a handful of cases in Pakistan and Afghanistan.

Efforts to develop a vaccine for HIV have been characterized by years of frustration, but recent progress has stirred renewed hope for a breakthrough.

Efforts to develop a vaccine for HIV have been characterized by years of frustration, but recent progress has stirred renewed hope for a breakthrough. One candidate that has showed some efficacy, the so-called Thai vaccine *(1)*, has been modified and improved to make it more likely to work against the clades of HIV found in southern Africa, where the burden is greatest. In 2016 the United States National Institute of Allergy and Infectious Diseases announced the results of the HVTN100 study, which demonstrated that this improved vaccine provoked immune responses that seemed to be associated with protection in the previous Thailand trial *(2)*. In fact the vaccine did better than the Thai vaccine in all five of the immunological tests chosen to determine whether development and testing should continue. A large phase III trial, which will enrol 5400 men and women at risk for HIV infection, is the first HIV vaccine candidate to reach this stage for 7 years. Other candidates, such as the "mosaic" vaccine being developed by Johnson & Johnson, are expected to follow.

Exciting experiments involving the simian immunodeficiency virus have shown that a vaccine carried into the body by a modified cytomegalovirus can produce profound widespread immune changes that can not only protect monkeys from infection but also in some cases eradicate existing infection *(3)*. Human versions of these experiments are still in the early stages. Other techniques involving broadly neutralizing antibodies, which block HIV in laboratory experiments, are also in the earlier stages of development *(4)*.

A cure for HIV would be a dream come true for millions of people currently living with HIV, and also for the ministers of health and finance facing ever-increasing costs of treating more and more people with lifesaving antiretroviral therapy. So far, only one person has been cured of HIV. Timothy Ray Brown, the so-called "Berlin patient", underwent a complex course of treatments for blood cancer unrelated to his HIV infection. Among the treatments were bone marrow transplants from a donor with natural resistance to HIV due to a genetic mutation. These procedures are painful, dangerous and expensive and not an option for widespread use. Indeed, other people living with HIV who have had bone marrow transplants have not been cured *(5)*.

The apparent eradication of HIV from a baby in the American state of Mississippi who received extremely early HIV treatment inspired great hope that a cure had been found for infants. Unfortunately, after more than two years off treatment, the virus re-emerged within the child *(6)*. Despite the disappointment, the results led to a set of trials aiming to demonstrate the effect of immediate treatment on infants who had only recently been exposed to HIV. Early results show that there are benefits in terms of the size of the reservoir and of the diversity of the virus within individuals *(7)*. Similar studies have been done in adults.

Another approach towards a cure seeks to "wake up" the HIV lurking in reservoirs within the gut and bone marrow, while continuing antiretroviral therapy to kill off the resulting HIV in the bloodstream *(8)*. Several studies using different medicines are ongoing, along with alternative strategies to boost the immune response to maximize the impact on the reservoir.

As with all such research and development, HIV vaccines and cures are expensive undertakings and will take some years to generate conclusive results. Funding for these endeavours has largely followed global trends, with a clear plateauing of resources over the past few years, and the large majority of funding coming from government and foundation sources in the United States of America. It is, however, encouraging that the European Union is now making substantial grants to European consortia for HIV vaccine research.

Addressing challenges across the life cycle

Reaching Fast-Track Targets requires an additional US$ 7 billion annually. These investments must be made wisely across the life cycle, using a location–population approach.

In the meantime, the expansion of HIV prevention, testing and treatment must continue at the Fast-Track pace agreed by the United Nations General Assembly. There is overwhelming evidence behind the services and structural actions in the results frameworks presented within this report. Examining the AIDS epidemic through the lens of the human life cycle is a compelling way to use these frameworks to guide the specific policy and programming decisions that must be made at national and local levels.

The global ambition to end AIDS is fuelled by past progress. The elimination of new HIV infections among children is a reality in a small but growing number of countries. The momentum established by *the Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive* emphasizes the importance of strategic partnerships among countries, civil society and the United Nations. Moving forward, girls and young women must be empowered to gain control over their sexual and reproductive health and rights. Boys and men must be adequately engaged to change the harmful gender norms that put women and girls at risk, and to inspire the greater responsibility and health-seeking behaviours among men required for consistent condom use, early diagnosis of HIV, rapid initiation of antiretroviral therapy, and strong treatment adherence for sustained viral suppression. Such measures can break the cycle of transmission among adult women, adult men and young women in high-prevalence settings.

Among key populations, comprehensive community-led approaches have been proven to overcome the huge societal barriers to HIV service access. South Africa and Peru are showing that national-level action is not limited to high-income countries. In the longer term, punitive laws and social norms that marginalize key populations within society must be changed to achieve the service coverage required for sustained impact.

The expansion of antiretroviral therapy has transformed HIV into a chronic manageable condition, and AIDS-related deaths are in steady decline. With roughly 2.1 million [1.8 million–2.4 million] new HIV infections occurring every year, however, lifelong treatment puts increasing pressure on health systems in both higher-income and lower-income countries. New adherence support strategies are required for the rapidly increasing number of children living with HIV who are transiting into adolescence and adulthood. At the same time, larger and larger numbers of people living with HIV reaching their fifties and sixties raise new challenges related to drug resistance and the interaction between HIV and age-related diseases.

Shared responsibility

The additional investments of low- and middle-income countries in recent years have driven further progress against AIDS as international investments have plateaued. The successful replenishment of the Global Fund to Fight AIDS, Tuberculosis and Malaria in September 2016, when donors pledged over US$ 12.9 billion for the next 3 years, reinforces international commitment to achieve Fast-Track Targets. Closing the US$ 7 billion annual funding gap, however, will require additional investment by all countries within the shared responsibility agenda promoted by UNAIDS.

These investments must be made wisely across the life cycle, using a location–population approach to ensure that evidence-informed, high-impact programmes are available in the geographical areas and among the populations in greatest need.

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[1]Compared with 2015 levels of coverage.

AIDS by the numbers

AIDS IS NOT OVER, BUT IT CAN BE

ENDING THE AIDS EPIDEMIC BY 2030 AS PART OF THE SUSTAINABLE DEVELOPMENT GOALS

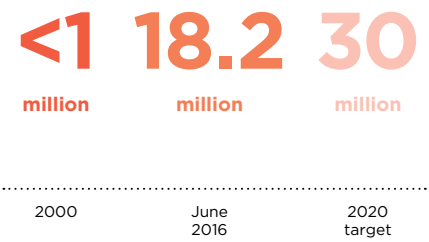
Fast-Track Targets

By 2020	By 2030
Fewer than **500 000** new infections	Fewer than **200 000** new infections
Fewer than **500 000** AIDS-related deaths	Fewer than **200 000** AIDS-related deaths
ZERO discrimination	**ZERO** discrimination

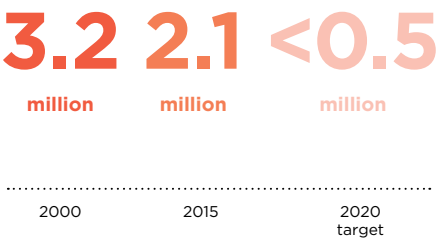
AIDS is not over, but it can be

Huge progress has been made since 2000 and millions of lives have been saved. But there are still important milestones to reach, barriers to break and frontiers to cross. The world has agreed to meet a set of global targets by 2020 as part of UNAIDS Fast-Track strategy to end the AIDS epidemic as a public health threat.

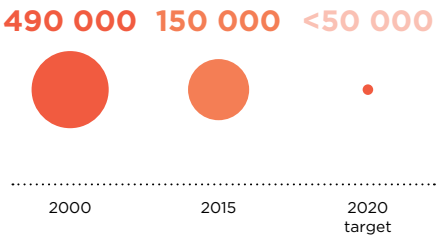
People living with HIV on antiretroviral therapy



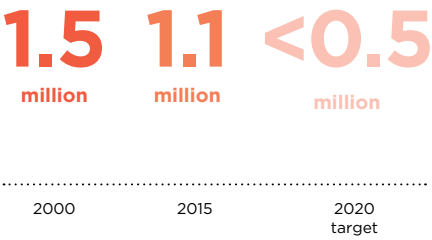
New HIV infections



New HIV infections among children

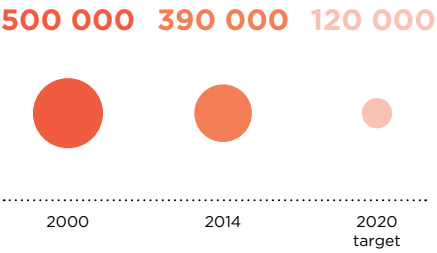


AIDS-related deaths

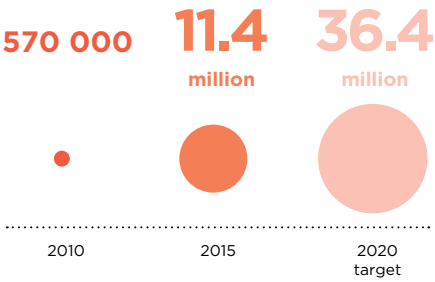


AIDS is not over, but it can be

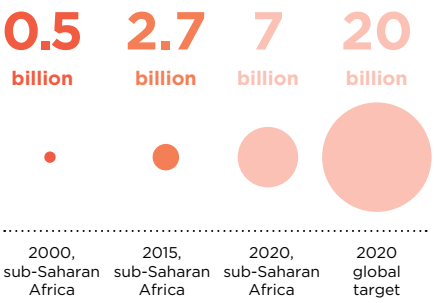
Tuberculosis-related AIDS deaths



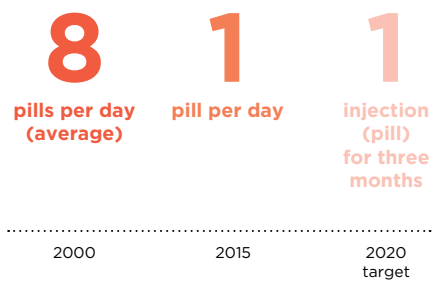
Total voluntary medical male circumcisions (14 priority countries in Africa)



Condoms procured



Number of pills to treat HIV



Cost of antiretroviral medicines per person per year

2000	2015	2020 target
US$ 10 000	US$ 100 first-line regimens	US$ 100 all available regimens

Investments for the AIDS response

2000	2015	2020 target
5 US$ billion	19 US$ billion	26 US$ billion

Countries that criminalize same-sex sexual relationships

2006	2016 June	2030 target
92	74	0

HIV-related travel restrictions

2008	2015	2020 target
59 countries	35 countries	0 countries

July 2016

Core epidemiology slides

UNAIDS

Global summary of the AIDS epidemic | 2015

Number of people living with HIV	Total	36.7 million [34.0 million–39.8 million]
	Adults	34.9 million [32.4 million–37.9 million]
	Women	17.8 million [16.4 million–19.4 million]
	Children (<15 years)	1.8 million [1.5 million–2.0 million]
People newly infected with HIV in 2015	Total	2.1 million [1.8 million–2.4 million]
	Adults	1.9 million [1.7 million–2.2 million]
	Children (<15 years)	150 000 [110 000–190 000]
AIDS-related deaths in 2015	Total	1.1 million [940 000–1.3 million]
	Adults	1.0 million [840 000–1.2 million]
	Children (<15 years)	110 000 [84 000–130 000]

UNAIDS

Global estimates for adults and children | 2015

People living with HIV	36.7 million [34.0 million–39.8 million]
New HIV infections in 2015	2.1 million [1.8 million–2.4 million]
AIDS-related deaths in 2015	1.1 million [940 000–1.3 million]

UNAIDS

About 5700 new HIV infections (adults and children) a day | 2015

- About 66% are in sub-Saharan Africa
- About 400 are among children under 15 years of age
- About 5300 are among adults aged 15 years and older, of whom:
  - almost 47% are among women
  - about 35% are among young people (15–24)
  - about 20% are among young women (15–24)

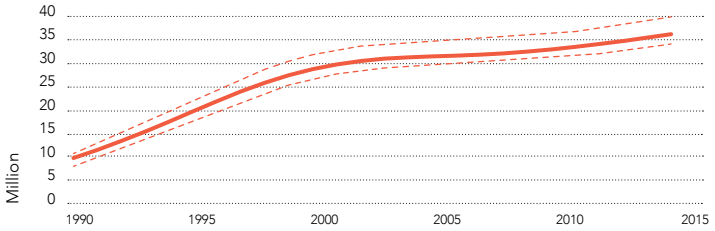
UNAIDS

Global estimates for children (<15 years) | 2015

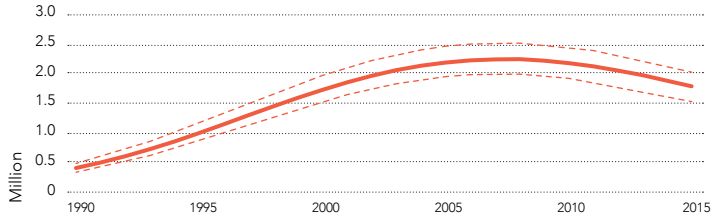
Children living with HIV	1.8 million [1.5 million–2.0 million]
New HIV infections in 2015	150 000 [110 000–190 000]
AIDS-related deaths in 2015	110 000 [84 000–130 000]

UNAIDS

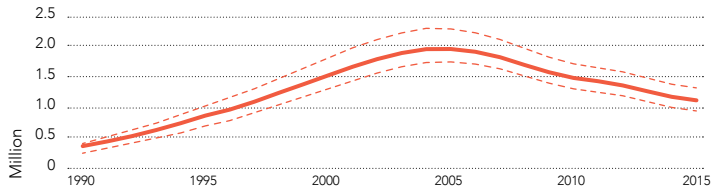
Global HIV trend data in 2015



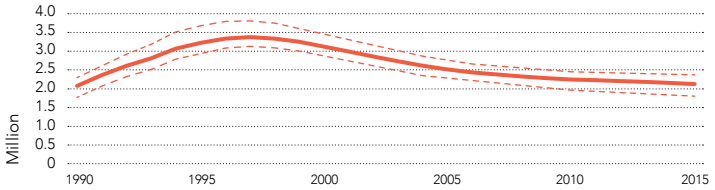
Number of people living with HIV—global



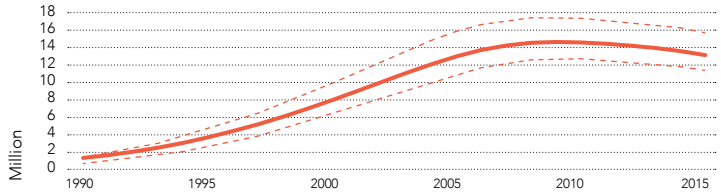
Number of children living with HIV—global



Number of AIDS-related deaths—global



Number of new HIV infections—global



Number of orphans due to AIDS—global

	2000	2005	2010	2011	2012	2013	2014	2015/(*2016)
People living with HIV	**28.9 million** [26.5 million–31.7 million]	**31.8 million** [29.4 million–34.5 million]	**33.3 million** [30.8 million–36.1 million]	**33.9 million** [31.4 million–36.7 million]	**34.5 million** [31.9 million–37.4 million]	**35.2 million** [32.6 million–38.1 million]	**35.9 million** [33.3 million–38.9 million]	**36.7 million** [34.0 million–39.8 million]
New HIV Infections (total)	**3.2 million** [2.9 million–3.5 million]	**2.5 million** [2.3 million–2.8 million]	**2.2 million** [2.0 million–2.5 million]	**2.2 million** [1.9 million–2.5 million]	**2.2 million** [1.9 million–2.4 million]	**2.1 million** [1.9 million–2.4 million]	**2.1 million** [1.9 million–2.4 million]	**2.1 million** [1.8 million–2.4 million]
New HIV infections (aged 15+)	**2.7 million** [2.5 million–3.0 million]	**2.1 million** [1.9 million–2.3 million]	**1.9 million** [1.7 million–2.1 million]	**1.9 million** [1.7 million–2.2 million]	**1.9 million** [1.7 million–2.2 million]	**1.9 million** [1.7 million–2.2 million]	**1.9 million** [1.7 million–2.2 million]	**1.9 million** [1.7 million–2.2 million]
New infections (aged 0–14)	**490 000** [430 000–560 000]	**450 000** [390 000–510 000]	**290 000** [250 000–350 000]	**270 000** [220 000–330 000]	**230 000** [190 000–290 000]	**200 000** [160 000–250 000]	**160 000** [130 000–220 000]	**150 000** [110 000–190 000]
AIDS-related deaths	**1.5 million** [1.3 million–1.8 million]	**2.0 million** [1.7 million–2.3 million]	**1.5 million** [1.3 million–1.7 million]	**1.4 million** [1.2 million–1.7 million]	**1.4 million** [1.2 million–1.6 million]	**1.3 million** [1.1 million–1.5 million]	**1.2 million** [990 000–1.4 million]	**1.1 million** [940 000–1.3 million]
People accessing treatment	**770 000** [680 000–800 000]	**2.2 million** [1.9 million–2.2 million]	**7.5 million** [6.6 million–7.8 million]	**9.1 million** [8.0 million–9.5 million]	**11 million** [9.6 million–11.4 million]	**13 million** [11.4 million–13.5 million]	**15 million** [13.2 million–15.6 million]	**18.2 million** [16.1 million–19.0 million] (*June 2016) **17 million** [15.0 million–17.7 million] (end 2015)
Total resources available for HIV (low- and middle-income countries)	**4.8 billion**	**9.4 billion**	**15.9 billion**	**18.3 billion**	**19.5 billion**	**19.6 billion**	**19.2 billion**	**19 billion**

Regional HIV data in 2015

Region	People living with HIV (total)	New HIV infections			AIDS-related deaths (total)	Total number accessing antiretroviral therapy
		total	Aged 15+	Aged 0–14		
Eastern and southern Africa	**19.0 million** [17.7 million–20.5 million]	**960 000** [830 000–1.1 million]	**910 000** [790 000–1.1 million]	**56 000** [40 000–76 000]	**470 000** [390 000–560 000]	**10 million**
Latin America and the Caribbean	**2.0 million** [1.7 million–2.3 million]	**100 000** [86 000–120 000]	**100 000** [84 000–120 000]	**2100** [1600–2900]	**50 000** [41 000–59 000]	**1.1 million**
Western and central Africa	**6.5 million** [5.3 million–7.8 million]	**410 000** [310 000–530 000]	**350 000** [270 000–450 000]	**66 000** [47 000–87 000]	**330 000** [250 000–430 000]	**1.8 million**
Asia and the Pacific	**5.1 million** [4.4 million–5.9 million]	**300 000** [240 000–380 000]	**280 000** [220 000–350 000]	**19 000** [16 000–21 000]	**180 000** [150 000–220 000]	**2.1 million**
Eastern Europe and central Asia	**1.5 million** [1.4 million–1.7 million]	**190 000** [170 000–200 000]	**190 000** [170 000–200 000]	…*	**47 000** [39 000–55 000]	**320 000**
Middle East and North Africa	**230 000** [160 000–330 000]	**21 000** [12 000–37 000]	**19 000** [11 000–34 000]	**2100** [1400–3200]	**12 000** [8700–16 000]	**38 000**
Western and central Europe and North America	**2.4 million** [2.2 million–2.7 million]	**91 000** [89 000–97 000]	**91 000** [88 000–96 000]	…*	**22 000** [20 000–24 000]	**1.4 million**

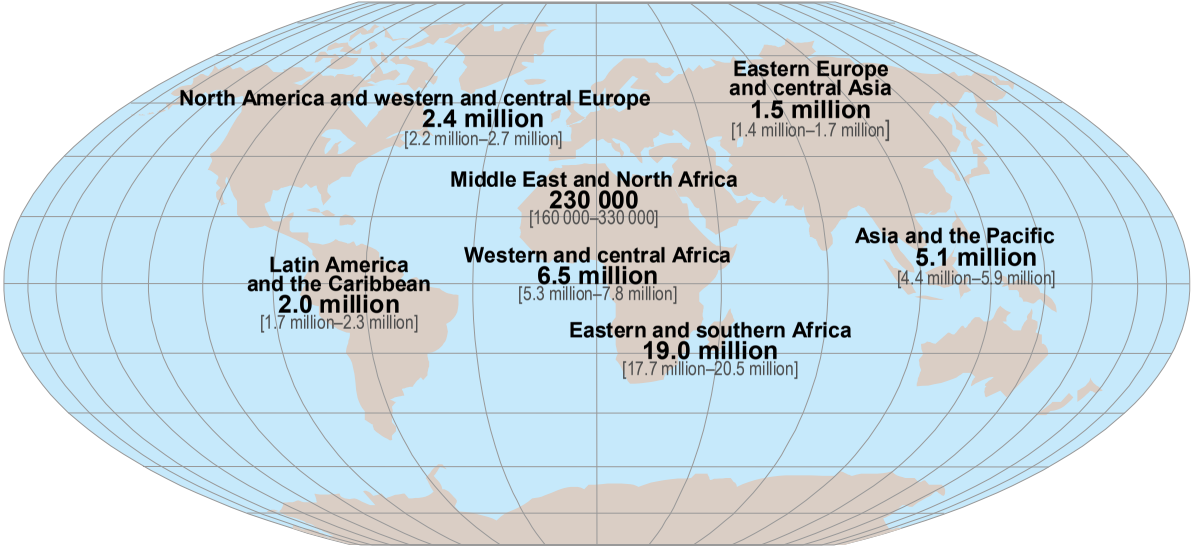
* Estimates were unavailable at the time of publication.

Regional antiretroviral therapy in 2015

	Percentage of adults (aged 15+) living with HIV accessing antiretroviral therapy	Percentage of children (aged 0–14) living with HIV accessing antiretroviral therapy	Percentage of pregnant women accessing antiretroviral medicines to prevent mother-to-child transmission of HIV
Eastern and southern Africa	**53%** [50–57%]	**63%** [56–71%]	**90%** [82–>95%]
Latin America and the Caribbean	**55%** [47–64%]	**64%** [54–76%]	**88%** [77–>95%]
Western and central Africa	**29%** [24–35%]	**20%** [16–25%]	**48%** [40–58%]
Asia and the Pacific	**41%** [35–47%]	**41%** [30–37%]	**39%** [34–44%]
Eastern Europe and central Asia	**21%** [19–22%]	…*	…*
Middle East and North Africa	**16%** [12–24%]	**20%** [16–25%]	**12%** [9–18%]
Western and central Europe and North America	**59%** [56–68%]	**>95%** [92–>95%]	**92%** [87–>95%]
GLOBAL	**46% [43–50%]**	**49% [42–55%]**	**77% [69–86%]**

* Estimates were unavailable at the time of publication.

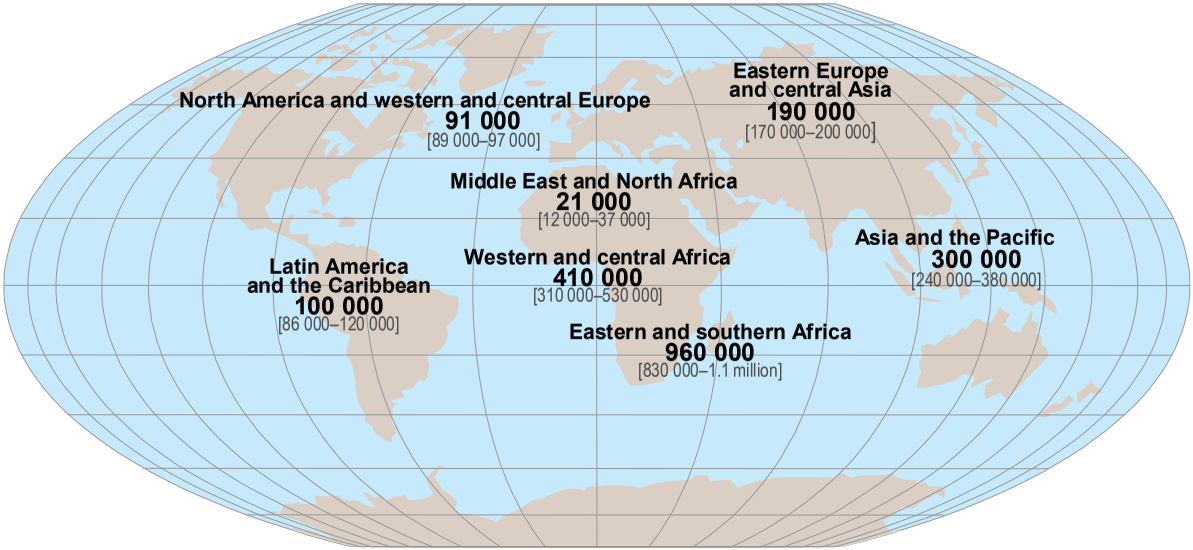
Adults and children estimated to be living with HIV | 2015



Total: 36.7 million [34.0 million–39.8 million]

UNAIDS

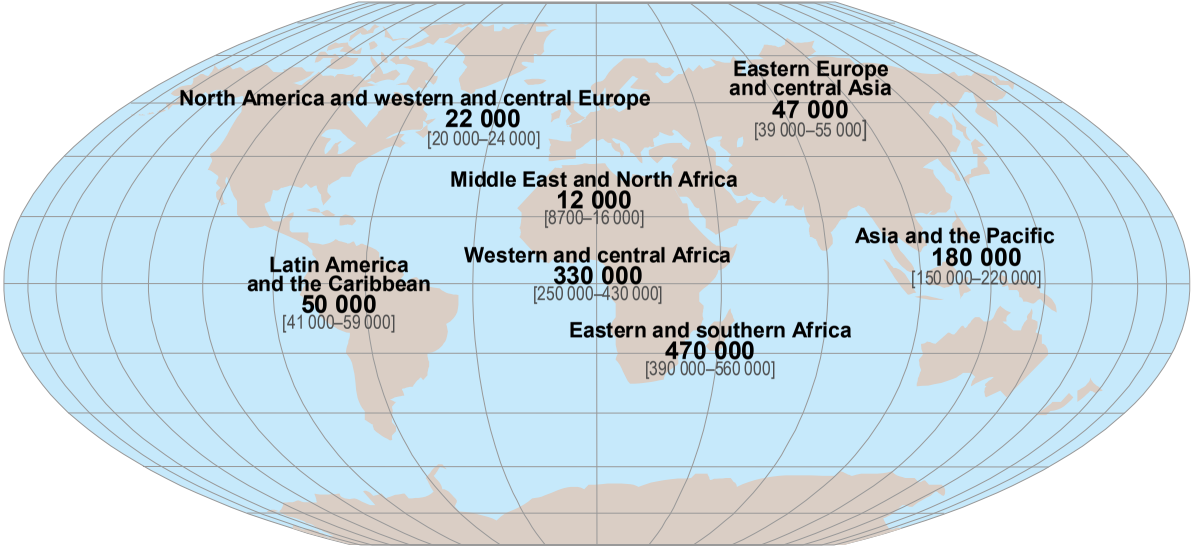
Estimated number of adults and children newly infected with HIV | 2015



Total: 2.1 million [1.8 million–2.4 million]

UNAIDS

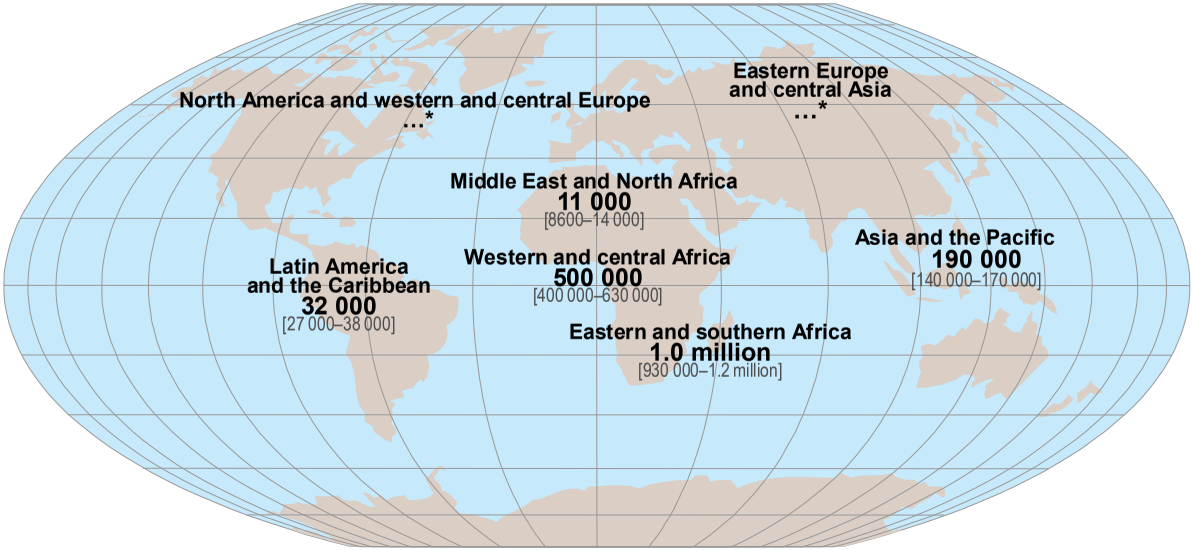
Estimated adult and child deaths from AIDS | 2015



Total: 1.1 million [940 000–1.3 million]

UNAIDS

Children (<15 years) estimated to be living with HIV | 2015



Total: 1.8 million [1.5 million–2.0 million]

* Estimates were unavailable at the time of publication.

UNAIDS

Estimated number of children (<15 years) newly infected with HIV | 2015

Total: 150 000 [110 000–190 000]

* Estimates were unavailable at the time of publication.

UNAIDS

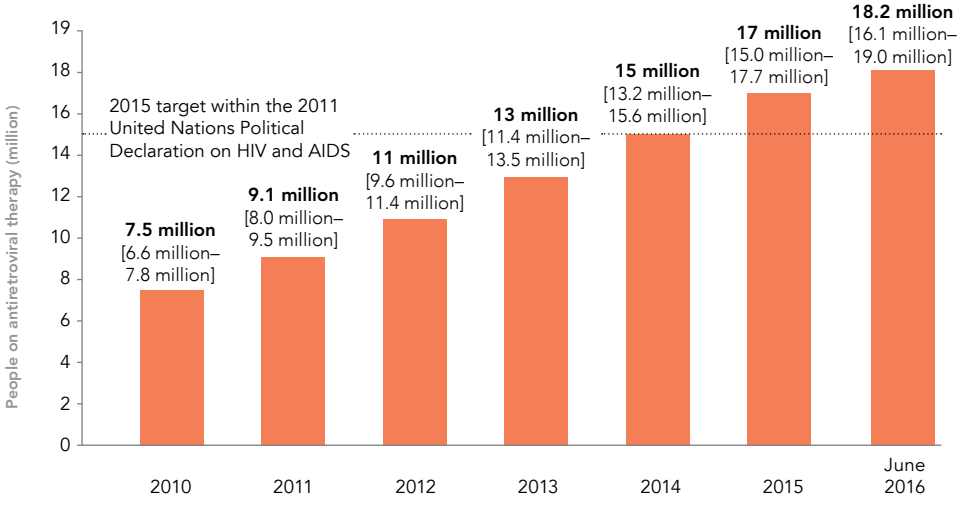
Estimated deaths in children (<15 years) from AIDS | 2015

Total: 110 000 [84 000–130 000]

* Estimates were unavailable at the time of publication.

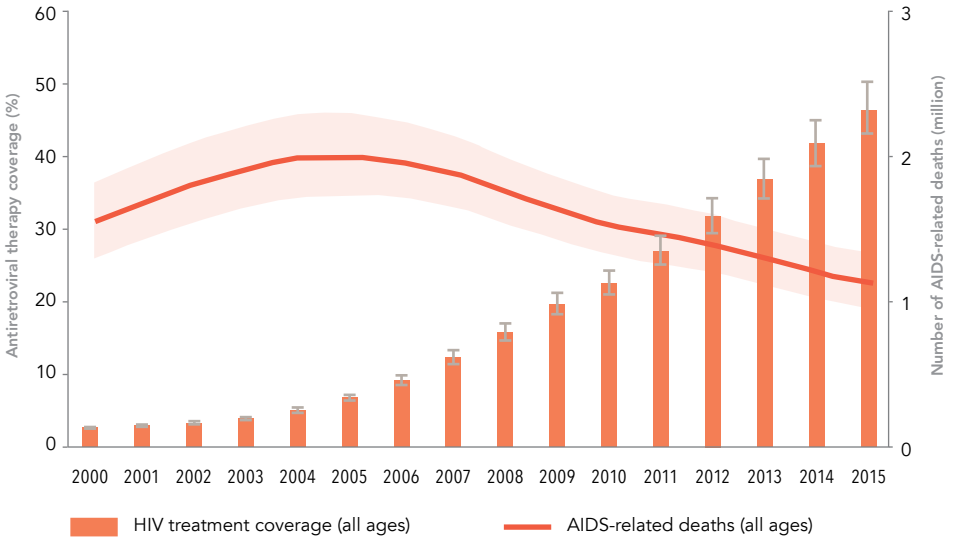
UNAIDS

Number of people living with HIV on antiretroviral therapy, global, 2010–2016



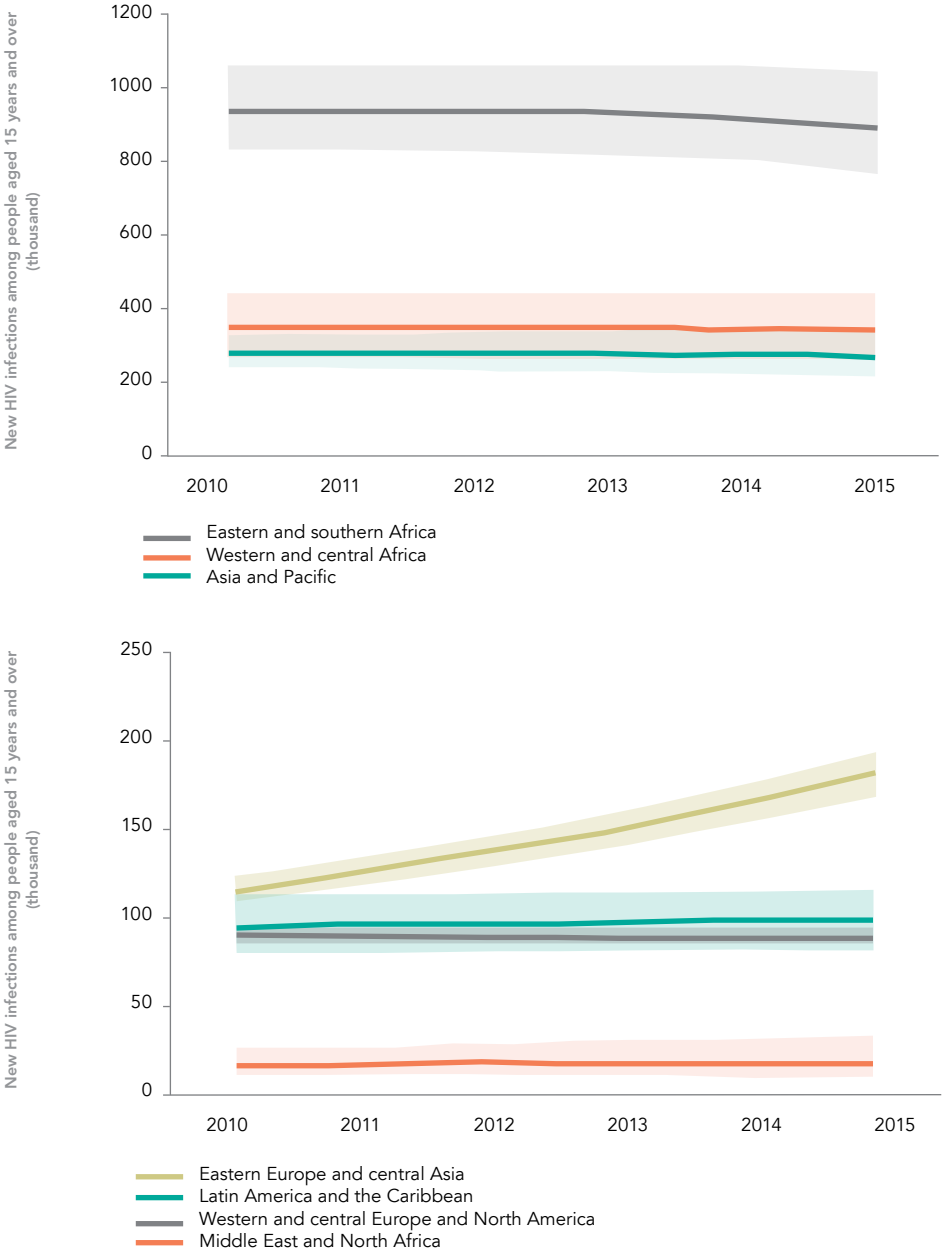
Sources: Global AIDS Response Progress Reporting (GARPR) 2016; UNAIDS 2016 estimates.

Antiretroviral therapy coverage and number of AIDS-related deaths, global, 2000–2015



Sources: GARPR 2016; UNAIDS 2016 estimates.

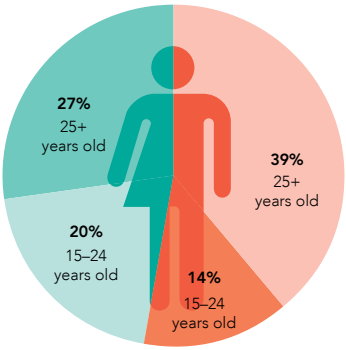
New HIV infections among people aged 15 years and over, by region, 2010–2015



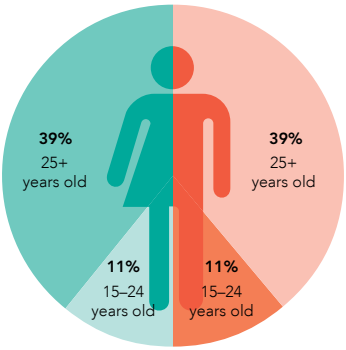
Source: UNAIDS 2016 estimates.

Distribution of new adult HIV infections and population by age and sex, global and in sub-Saharan Africa, 2015

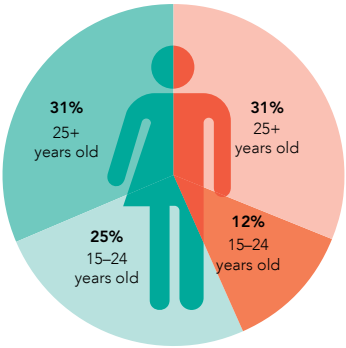
NEW HIV INFECTIONS AMONG ADULTS, BY AGE AND SEX, GLOBAL, 2015



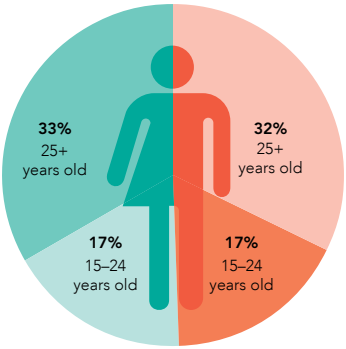
ADULT POPULATION, BY AGE AND SEX, GLOBAL , 2015



NEW HIV INFECTIONS AMONG ADULTS, BY AGE AND SEX, SUB-SAHARAN AFRICA, 2015



ADULT POPULATION, BY AGE AND SEX, SUB-SAHARAN AFRICA, 2015



Source: UNAIDS 2016 estimates.

Distribution of new HIV infections among population groups, by region, 2014

Source: UNAIDS special analysis, 2016.

Methodological note: Estimated numbers of new HIV infections by key population were compiled from country Spectrum files submitted in 2015 to UNAIDS (2014 data), available modes-of-transmission studies and additional sources of data drawn from GARPR reports. Where data were lacking, regional medians were calculated from available data and applied to countries' populations.

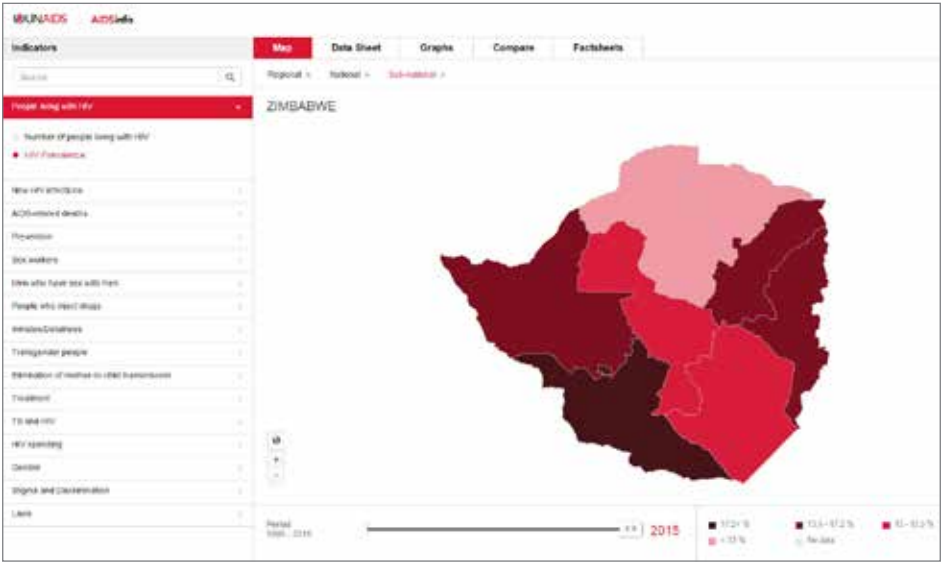
For more information: aidsinfo.unaids.org

The data provided in this document are just a sample of the data available from UNAIDS.

Additional data are available at aidsinfo.unaids.org, including:

- Additional Global AIDS Response Progress Reporting Indicators on prevention, mother-to-child transmission, 90–90–90 targets, stigma and discrimination
- A Key Population Atlas of maps on key populations, including the latest available data on key populations at increased risk of HIV infection.
- Estimates of new HIV infections, people living with HIV and AIDS-related deaths by different age groups, children (age 0–14 years), adolescents (age 10–19 years), young people (age 15–24 years), adults (age 15–49) older people (age 50 years and over), and by sex
- Subnational data for selected countries
- Data in different formats: spreadsheet, maps, graphics
- Comparable data over multiple years, and across countries, which can also be extracted to spreadsheets for further analysis.

(sample screen shot from aidsinfo.unaids.org)



annex on methods

UNAIDS methods for estimating mid-2016 antiretroviral therapy numbers

What data are used to construct UNAIDS estimates of the number of people on antiretroviral therapy?

As agreed by the United Nations General Assembly, countries periodically submit progress reports on their AIDS responses to UNAIDS, using a standard set of core indicators. On a semi-annual basis, UNAIDS invites countries worldwide to submit updates on the number of people on antiretroviral therapy, by age, sex and geographical location at the end of the reporting period. For most countries, numbers of people on treatment are reported through the Global AIDS Response Progress Reporting (GARPR) online tool and represent aggregated country-specific programme and facility-level data. For some countries, mostly high-income countries or countries in conflict, recent numbers of people currently on antiretroviral therapy are not regularly available. To monitor global progress, UNAIDS constructs estimates for these countries using treatment numbers submitted during previous reporting periods or obtained from national reports or other publications.

Treatment estimates published in this report cover 174 of 195 countries and account for more than 98% of the world's population. Data for 21 countries, most of which have populations of fewer than 250 000 people and an extremely low burden of HIV, were not available.

How were the mid-2016 estimates of the number of people on antiretroviral therapy constructed?

UNAIDS used a two-step process to construct the mid-2016 estimates. In the first step, the numbers of adults and children on antiretroviral therapy at the end of June 2016 reported by the 124 countries that submitted data through GARPR were aggregated. A total of 14.8 million people were counted as being on antiretroviral therapy using this data source. In the second step, UNAIDS constructed estimates for 50 countries that did not submit data for mid-2016. Data previously provided to UNAIDS or other published data on treatment were used to inform these estimates. Using these sources, UNAIDS estimated that the numbers of people on treatment in these countries grew over the previous half year (end of 2015 to mid-2016) by 0.2% among children and by 6.9% among adults. These rates were applied to the end-2015 number on treatment for each of the 50 countries to derive the estimates of children and adults on treatment in these countries on 30 June 2016. A total of 3.4 million people were estimated to be accessing antiretroviral treatment using this approach.

The total reported and estimated numbers on treatment were combined to obtain the global number of 18.2 million people on treatment, including 910 535 children aged under 15 years.

What are the characteristics of the countries where numbers of people on antiretroviral treatment are estimated?

Of the 50 countries with estimated treatment numbers for mid-2016, 18 countries were in western and central Europe and North America, 11 in eastern Europe and central Asia, 11 in Latin America and the Caribbean, 5 in Asia and the Pacific, 4 in western and central Africa, and 1 in eastern and southern Africa.

According to historical and published estimates, the countries in eastern and southern Africa, western and central Africa, and western and central Europe and North America had slower increases among adults compared with the average, while countries in Asia and the Pacific, Latin America and the Caribbean, the Middle East and North Africa, and eastern Europe and central Asia had higher average increases among adults. For children, evidence for larger-than-average increases was seen only in Asia and the Pacific and the Middle East and North Africa.

Among these 50 countries, the 10 with the largest estimated numbers of people on antiretroviral therapy for the mid-2016 reporting period were the United States of America, Ethiopia, the Russian Federation, France, Spain, the United Kingdom of Great Britain and Northern Ireland, Italy, Colombia, Germany and Argentina.

What efforts do countries and UNAIDS make to validate reported numbers of people on antiretroviral treatment submitted through GARPR?

Overall responsibility to guarantee the quality and accuracy of reports on the numbers of people on antiretroviral therapy resides with national governments. Countries are advised through global guidance on the construction of the core GARPR indicators *(1)* that all efforts should be made at the facility and national levels to adjust the numbers of people on treatment for potential loss to follow-up, including people who have died, migrated out of the country or region, transferred to another facility, or disengaged from treatment. Also, standard operating procedures should be in place to avoid duplicate counting of individuals across facilities or over time, and to ensure that all facility-level data are reported in a timely manner. This guidance also references the need for countries to triangulate programme data with national procurement and drug monitoring systems, and to adjust reported numbers as appropriate. Many countries undertake data quality assessments or reviews that monitor the extent to which facilities are able to accurately report the number of people on treatment during reporting periods and, to a more limited extent, adjust treatment numbers to account for these inconsistencies.

For the mid-2016 estimates of people on antiretroviral therapy, UNAIDS validated all data before publication. Validation activities for the mid-2016 reporting period included comparing reported numbers with previous years' data and other global procurement and reporting sources to identify inconsistencies in the data over time and by age and sex. UNAIDS also reviewed country submissions to ensure that private-sector data were included, where available. Queries were subsequently sent to countries and resolved before publication.

To assess the validity and quality of the number of people on antiretroviral therapy reported in previous years[1], comparisons were made with a number of independent data sources, including the WHO Global Drug Price Reporting Mechanism (GPRMS), WHO antiretroviral regimen surveys, antiretroviral drug procurement and patient tracking data from selected countries, Indian generic manufacturer transaction data, pharmaceutical procurement data of PEPFAR and the Global Fund, numbers of people currently on treatment reported to PEPFAR, selected countries' data quality assessments, and national population-based surveys that included measurement of antiretroviral drug metabolites in the blood samples of survey participants.

Of the 17 million people who were estimated to be on antiretroviral therapy globally at the end of 2015, 15.3 million were in low- and middle-income countries, of whom 13.9 million were in countries that have access to generic versions of antiretroviral medicines. An additional validation exercise was conducted in 11 countries[2] with the highest reported numbers of people on antiretroviral therapy. These countries also account for 80% of all people on antiretroviral therapy from generic-accessible low- and middle-income countries.

Data were analysed on exports of antiretroviral drugs by Indian pharmaceutical companies (including Mylan[3], Hetero, Aurobindo and Cipla) that supplied approximately 77% of the generic antiretroviral medicines in generic-accessible low- and middle-income countries in 2014. This analysis showed that the volumes procured in generic-accessible countries could meet the needs of the reported numbers of people on antiretroviral therapy. It suggested that a quantity of antiretroviral drugs to treat 13.7 million–15.7 million people was procured in 2014, compared to the reported 13.9 million people on antiretroviral therapy in generic-accessible low- and middle-income countries *(2)*. Triangulation of reported antiretroviral therapy numbers from the 11 countries—using data from national population-based surveys, GPRMS, data quality assessments and PEPFAR and Global Fund procurement data— validated the overall numbers for the majority of countries where alternative data sources were available. In some countries, the quality of the data available at health facilities and reported to the national information system, although improving over time, was of concern. Because of the uncertainty in data quality in some countries, the estimated numbers of people on antiretroviral therapy presented in this report are accompanied by ranges representing this uncertainty.

How does UNAIDS calculate ranges for the number of people on antiretroviral treatment?

A recent secondary analysis of treatment data quality review audits in selected high-burden countries conducted between 2011 and 2016 has been used as the basis for

[1] End-2015 being the most recent year for which other published data sources were available.

[2] Ethiopia, India, Kenya, Malawi, Mozambique, Nigeria, South Africa, Uganda, United Republic of Tanzania, Zambia and Zimbabwe.

[3] Mylan itself is not India-based, but its antiretroviral drug manufacturing continues to be primarily in India.

constructing upper and lower ranges around current and historical estimates of the numbers of people on antiretroviral therapy. The review suggested a plausible upper range due to underreporting of 4% and a lower range due to overreporting of 12%. The primary reason for underreporting was missing or delayed reporting of facility data to the national level. Overreporting was due primarily to not removing people from registries who stopped treatment, died or transferred facilities. Other errors, such as incorrectly abstracting data from facility-based registries or completing reporting forms, led to over- and underreporting to varying degrees of magnitude.

There is some limited evidence from countries with multiple data quality assessments that the accuracy of counting the numbers of people on treatment is improving. Increased use of electronic medical records and patient monitoring systems may be contributing to a reduction in reporting errors; however, the analysis for construction of the ranges conservatively assumed that the quality of the reported data was unchanged between 2010 and mid-2016.

What future steps will UNAIDS take to ensure the quality and accuracy of reported numbers of people on antiretroviral therapy?

UNAIDS, WHO and other partners continue to support countries to improve the accuracy of the numbers of people reported to be on treatment. These efforts aim to strengthen and expand HIV programme monitoring and surveillance systems, and to build the capacity of national, regional and clinical staff to collect, report and analyse data from these systems. UNAIDS and WHO are also working with drug producers and countries to triangulate facility-reported numbers of people on antiretroviral therapy with data from drug exports, in-country drug distribution systems, surveys and any other relevant data.

UNAIDS methods for estimating the proportion of young people aged 15–19 years living with HIV who were vertically infected

The Spectrum AIDS Impact module estimates the number of people living with HIV from 1970 to the most recent year. The model uses demographic data from the United Nations Population Division to ensure demographic dynamics are captured in the model. In addition, the model uses data on the number of pregnant women who received antiretroviral medicines to reduce the probability of transmission to their children. Children who are infected vertically are then exposed to a set of survival probabilities, depending on whether they start antiretroviral therapy.

To estimate the proportion of young people living with HIV aged 15–19 years globally who were vertically infected and the proportion who were infected through sexual or injection-related transmission, two scenarios are run. The first scenario reflects best

available knowledge of the current number of children living with HIV, given the reported scale-up of services to prevent mother-to-child transmission. A second hypothetical scenario is run that assumes no HIV transmission occurred between mothers and children since the start of the epidemic. All of the young people living with HIV aged 15–19 years in this scenario were infected through sexual or injection-related transmission. The difference in the numbers of young people living with HIV between the two scenarios is the estimated number who were vertically infected.

References

1. Global aids response progress reporting 2016. Geneva: Joint United Nations Programme on HIV/AIDS; 2016 (https://aidsreportingtool.unaids.org/static/docs/GARPR_Guidelines_2016_EN.pdf).

2. ARV market report: the state of the antiretroviral drug market in low- and middle-income countries, 2014–2019. Boston, MA: Clinton Health Access Initiative; 2015 (http://www.clintonhealthaccess.org/content/uploads/2015/11/CHAI-ARV-Market-Report-2015_FINAL.pdf).

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UNAIDS

UNAIDS
Joint United Nations
Programme on HIV/AIDS

20 Avenue Appia
CH-1211 Geneva 27
Switzerland

+41 22 791 3666

unaids.org