

PROGRESS REPORT



GLOBAL HEALTH SECTOR RESPONSE TO HIV, 2000–2015

FOCUS ON INNOVATIONS
IN AFRICA



PROGRESS REPORT

**GLOBAL HEALTH
SECTOR RESPONSE
TO HIV, 2000-2015**

**FOCUS ON INNOVATIONS
IN AFRICA**

WHO Library Cataloguing-in-Publication Data :

Global health sector response to HIV, 2000-2015: focus on innovations in Africa: progress report

1.HIV Infections – prevention and control. 2.Acquired Immunodeficiency Syndrome. 3.Health Care Sector. 4.Africa. 5.Program Evaluation. I.World Health Organization.

ISBN 978 92 4 150982 4

(NLM classification: WC 503.6)

© World Health Organization 2015

All rights reserved. Publications of the World Health Organization are available on the WHO web site (www.who.int) or can be purchased from WHO Press, World Health Organization, 20 Avenue Appia, 1211 Geneva 27, Switzerland (tel.: +41 22 791 3264; fax: +41 22 791 4857; e-mail: bookorders@who.int).

Requests for permission to reproduce or translate WHO publications –whether for sale or for non-commercial distribution– should be addressed to WHO Press through the WHO website (www.who.int/about/licensing/copyright_form/en/index.html).

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

The mention of specific companies or of certain manufacturers' products does not imply that they are endorsed or recommended by the World Health Organization in preference to others of a similar nature that are not mentioned. Errors and omissions excepted, the names of proprietary products are distinguished by initial capital letters.

All reasonable precautions have been taken by the World Health Organization to verify the information contained in this publication. However, the published material is being distributed without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use.

Acknowledgements

This report would not have been possible without the collaboration of, and contributions from the health ministries and national AIDS programmes that lead HIV surveillance, monitoring and evaluation tasks at country level. Data from countries were jointly collected and validated by WHO, UNICEF and UNAIDS through the Global AIDS Response Progress Reporting (GARPR) process, which is based on a reporting platform that UNAIDS manages. The United States Centers for Diseases Control and Prevention (CDC) is a major source of financial support for WHO's work on monitoring and evaluation of the HIV response. Its support made it possible to produce this report.

Photo credits: © John Rae

Map production: Dure Technologies PVT SA (Figure 3) and WHO Health Statistics and Information Systems (HSI) for all other maps

Printed in France

Layout: blossoming.it

CONTENTS

ACRONYMS AND ABBREVIATIONS	3
FOREWORD	5
EXECUTIVE SUMMARY	7
INTRODUCTION	17
CHAPTER ONE	
Fifteen years of progress in the global HIV response	19
1.1 SHIFTING THE COURSE OF THE HIV EPIDEMIC	19
1.1.1 Reducing the number of people newly infected with HIV	
1.1.2 Reducing HIV transmission from mothers to children	
1.1.3 Reducing the number of people dying from HIV-related causes	
1.2 HOW THE IMPACT HAS BEEN ACHIEVED	28
1.2.1 Political commitment and partnerships were focused on targets	
1.2.2 A public health approach was put into practice	
1.2.3 Civil society extended the HIV response into communities	
1.2.4 Funding was mobilized and costs were reduced	
1.2.5 Innovations in science and implementation were widely used	
1.2.6 Data improved and increasingly drove decisions	
1.3 A PLATFORM FOR ENDING THE AIDS EPIDEMIC	34
1.3.1 A set of decisive targets lies ahead ...	
1.3.2 ... But a big divide remains	
1.3.3 Action for closing the gaps	
CHAPTER TWO	
The HIV prevention and treatment cascade: progress, gaps and priorities	39
2.1 PREVENTING PEOPLE FROM BECOMING NEWLY INFECTED WITH HIV	39
2.1.1 Reducing new infections with sexual behaviour change and condom use	
2.1.2 Expanding voluntary medical male circumcision	
2.1.3 Eliminating the mother-to-child transmission of HIV	
2.1.4 Reaching key populations with HIV prevention services	
2.1.5 Using ARV medicines for prevention	

2.2	HIV TESTING AND LINKAGE TO CARE	58
2.2.1	Diagnosing people living with HIV	
2.2.2	Linking people to HIV treatment and prevention	
2.3	TOWARDS TREATMENT FOR ALL	62
2.3.1	Closing the gaps in treatment coverage	
2.3.2	Starting HIV treatment earlier	
2.3.3	Achieving viral suppression	
2.3.4	Closing the gaps in treating children and adolescents	
2.3.5	Tackling comorbidities	
CHAPTER THREE		
	The next 15 years – towards a sustainable path to end AIDS	81
3.1	TOWARDS THE GLOBAL HIV TARGETS FOR 2020 AND 2030	81
3.2	FIVE STRATEGIC AREAS FOR ACTION	82
3.2.1	Using strategic information for decisions and accountability	
3.2.2	Selecting the essential package of HIV services	
3.2.3	Achieving equity and quality	
3.2.4	Sustainable funding, reduced costs	
3.2.5	Innovations for acceleration and impact	
3.3	CONCLUSION	90
	EXPLANATORY NOTES	91
	REFERENCES	95

ACRONYMS AND ABBREVIATIONS

AIDS	acquired immune deficiency syndrome
ART	antiretroviral therapy
ARV	antiretroviral
d4T	stavudine
EFV	efavirenz
HIV	human immunodeficiency virus
NVP	nevirapine
PEP	post-exposure prophylaxis
PEPFAR	(United States) President's Emergency Plan for AIDS Relief
PMTCT	prevention of the mother-to-child transmission (of HIV)
PrEP	pre-exposure prophylaxis
STI	sexually transmitted infection
TB	tuberculosis
UNAIDS	Joint United Nations Programme on HIV/AIDS
UNICEF	United Nations Children's Fund
US\$	United States dollar
WHO	World Health Organization



FOREWORD

In 2000, we had not yet created a global public health response covering treatment, prevention and care to tackle the HIV epidemic in all regions. HIV prevention programmes were underway and some were bringing success, but treatment was out of reach for most people. A fully-fledged health sector response to HIV was still being developed.

In the WHO African Region, especially, the epidemic was overwhelming health systems and devastating communities. We saw how hospitals struggled to cope and wards filled with people dying of AIDS, how families bravely tended the ill, how funerals became a staple of community life.

More than 70% of the people acquiring HIV lived in Africa, yet hardly any were receiving HIV treatment. In many countries in eastern and southern Africa, life expectancy was declining sharply.

Fifteen years later, there has been a sea change around the world, and especially in Africa, as this report documents. Immense challenges remain, but phenomenal progress has been made.

The HIV epidemic is claiming fewer lives, and fewer people are acquiring HIV. Almost 16 million people are receiving HIV treatment, including 11.4 million in Africa. A majority of pregnant women living with HIV receive antiretroviral medicines, which protects them and their children against HIV.

Countries achieved this by building and then scaling up a global public health response to HIV, one that puts the health and wellbeing of communities first. They understood that a successful HIV response has to bring together partners and genuinely involve affected communities.

This report reviews the bold achievements and challenges of the health sector response to HIV over the past 15 years

and the extraordinary gains that have been achieved around the world, especially in the African Region. It highlights how the public health approach has been applied and how innovations have been used to maximize its impact. It shows how mobilizing political commitment, involving communities, building partnerships and sustaining solidarity have enabled countries to overcome odds that seemed insurmountable.

Ending the AIDS epidemic by 2030 is now a realistic prospect. But the report does not shy away from the major challenges that remain. Half the people living with HIV globally do not know they have acquired the virus and do not receive treatment that can save their lives and prevent other people from becoming infected.

The report highlights systematically the main gaps and shortcomings and the action needed to end the AIDS epidemic as a serious public health threat. In particular, a sharp focus on reducing by 75% the number of people acquiring HIV in the next five years is needed to put us on a sustainable path to end the AIDS epidemic. This will require the full force of the public health sector response to HIV, one that is integrated with other health and development sectors and that links communities and clinics in innovative ways.

The next 15 years will be equally daunting – yet countries today can build on the successes, lessons and innovations achieved in each region, to face the immense challenges ahead. The impact and further potential of our public health response to HIV is clear, particularly when the response is supported at all levels by committed leadership and partners, when it can rely on capable health systems and when it builds on the determination and experience of communities.

We encourage countries in all regions to sustain their achievements, face the challenges, and to scale up their HIV responses to reach the target of ending HIV/AIDS as part of the Sustainable Development Goals.



Dr Winnie Mpanju-Shumbusho

Assistant Director-General
HIV/AIDS, Tuberculosis, Malaria and Neglected Tropical Diseases
World Health Organization



Dr Matshidiso Moeti

Regional Director for Africa
World Health Organization



EXECUTIVE SUMMARY

The global HIV response has been remarkably transformed in the past 15 years.

In 2000, a global public health response to the epidemic did not yet exist. Some prevention programmes had achieved success, and a handful of mostly high-income countries provided access to HIV treatment. But these were the exceptions. In the entire WHO African Region, for example, about 11 000 of the almost 21 million people living with HIV were receiving antiretroviral therapy (ART). The situation was similar in the South-East Asia Region and Western Pacific Region, where about 4 million people were living with HIV. In much of the world, few people who acquired HIV survived.

Fifteen years later, a global public health response combining prevention, treatment and care has been built around the world.

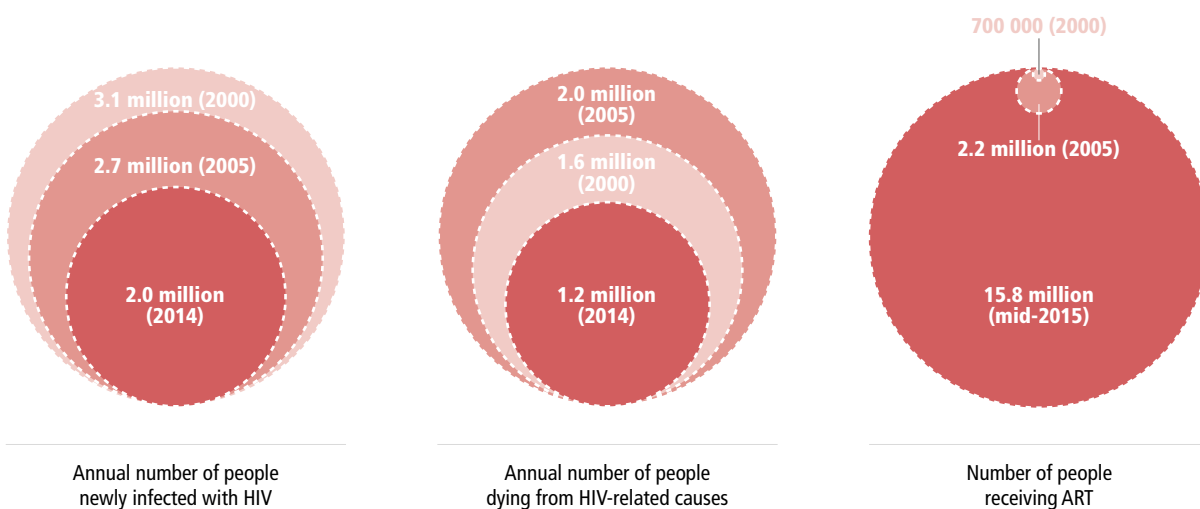
HIV programmes are now increasingly comprehensive. They promote and support prevention, bring treatment to many millions of people, deliver life-saving services to remote communities and make it easier for people to use and benefit from those services. They have proven that services can be delivered effectively, equitably and at massive scale in very difficult circumstances.

Successful HIV responses are not yet universal, but they are common enough to have made a huge impact in the past 15 years.

- **The number of adults and children newly infected with HIV** globally declined by 35% in 2000–2014.
- **The number of people dying from HIV-related causes** declined by 24% in 2000–2014 and by over 40% since 2004, the peak year.
- **HIV treatment** reached almost 16 million people in mid-2015 – more than 11 million of them in the African Region, where only about 11 000 people had been receiving treatment in 2000.
- **Millennium Development Goal 6**, which called for halting and beginning to reverse the spread of HIV by 2015, was achieved, and the HIV response contributed to significantly reducing child mortality (Millennium Development Goal 4) and maternal mortality (Millennium Development Goal 5).

The global health response to HIV represents one of the great public health feats of recent times. It is the result of enormous commitment and solidarity, strong partnerships, generous funding and other support, and far-sighted innovations – much of it evident in the African Region, which is a major feature of this report.

Fig. 1. Progress in the global HIV response, 2000–2015



Fewer people newly infected and fewer people dying

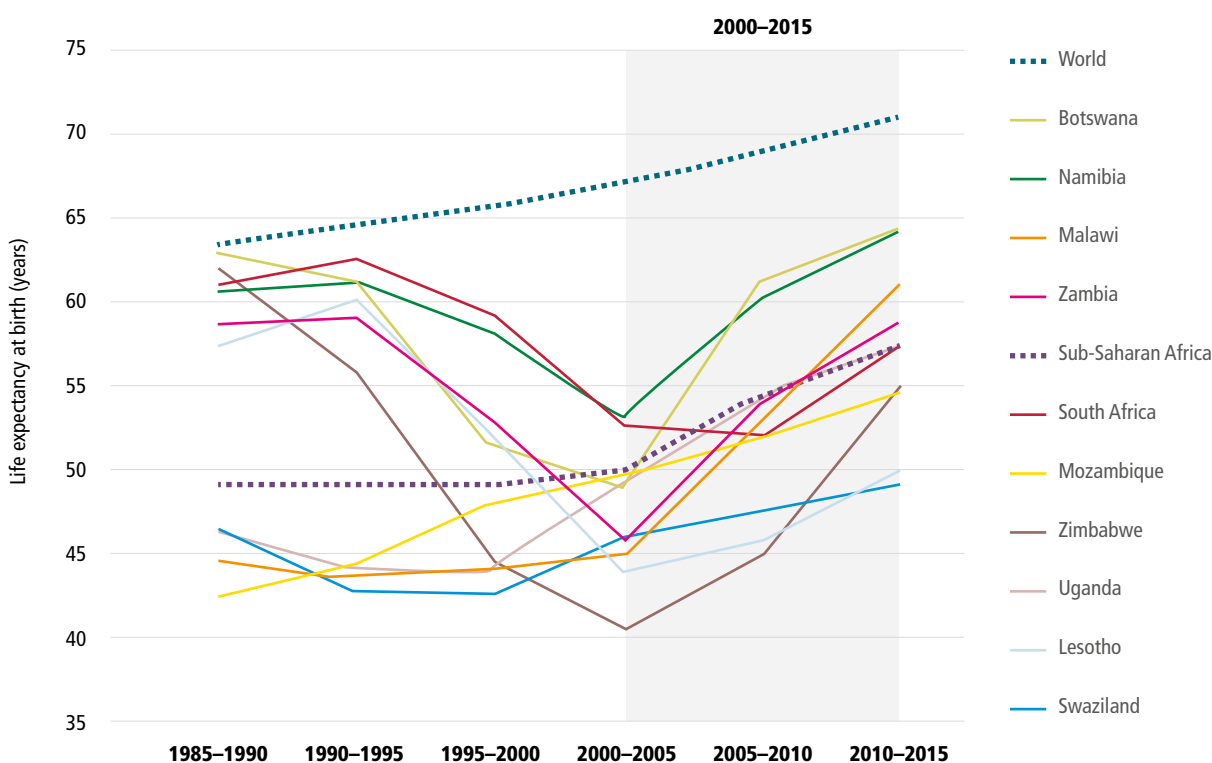
The estimated 2.0 million [1.9 – 2.2 million] people who acquired HIV globally in 2014 was the lowest number since 1990 and 35% fewer than the 3.1 million [3.0 – 3.3 million] in 2000. The decline was even steeper in the African Region – 41% between 2000 and 2014 – and exceeded 50% in several countries with a great burden of HIV infection.

The number of children (younger than 15 years) newly infected with HIV globally was reduced by 58% between 2000 and 2014. Rapid expansion of services for preventing the mother-to-child transmission of HIV and increasing use of more effective drugs prevented about 1.4 million children from becoming infected with HIV globally in the past 15 years, about 1.2 million of them in the African Region.

The number of people dying from HIV-related causes has fallen sharply as access to ART increased. The estimated 1.2 million [980 000–1 600 000] people who lost their lives to HIV in 2014 were 24% fewer than 2000 and 42% fewer than the peak in 2004. The number of children younger than 15 years dying from HIV-related causes declined even more rapidly than among adults.

The impact of HIV treatment programmes has been massive. An estimated 7.8 million HIV-related deaths were averted between 2000 and 2014. Several countries with a great burden of HIV infection have experienced substantial improvements in life expectancy.

Fig. 2. Changes in life expectancy at birth in selected countries in the WHO African Region with a high burden of HIV infection, 1985–2015



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision.

Very few other public health interventions in the recent past have had as rapid and dramatic an impact on individual and population health outcomes as the scaling up of ART, globally and especially in Africa.

At the end of 2014, about 4 in 10 people living with HIV globally were receiving ART. In the African Region, people living with HIV are now more likely to receive HIV treatment than their peers in other WHO regions, except for the Region of the Americas.

How Africa changed the course of its HIV epidemic

Faced with the largest HIV epidemics in the world, many countries in the African Region overcame formidable constraints to build and sustain national public health programmes powerful enough to turn the tide against their epidemics. The number of people acquiring HIV in the African Region fell sharply during 2000–2014, and the extraordinary rollout of HIV treatment averted an estimated 5.4 million deaths. Countries achieved this by assimilating innovations, by overcoming hurdles in implementation and by scaling up interventions, typically against a backdrop of limited resources and constrained health systems.

In many African countries, HIV services were brought closer to communities by combining the respective strengths of health clinics and communities. Countries took HIV treatment to scale, building the world's biggest HIV treatment programmes, by using the public health approach recommended by WHO. They substantially cut children's risks of acquiring HIV by successfully linking HIV and antenatal care services. They implemented large-scale prevention programmes and adopted new methods, such as voluntary medical male circumcision, as well as new HIV testing approaches to diagnose more people living with HIV. They brought together services for preventing and treating HIV and tuberculosis in ways that saved an estimated 1.3 million lives in Africa between 2005 and 2014.

Progress in the WHO regions: success shadowed by major challenges

The health sector responses to HIV have grown and improved in all regions, though to varying degrees.

African Region

Some of the most impressive transformation has occurred in the African Region, where HIV responses have increased dramatically in both scale and quality. The number of adults and children newly infected with HIV in the African Region was cut by 41% in 2000–2014, from 2.3 million [2.2–2.4 million] to 1.4 million [1.2–1.5 million]. This was the only region to register a consistent drop in new infections after 2010. Sustained national prevention programmes contributed to these declines. Scaled-up and improved programmes for preventing the mother-to-child transmission of HIV led to a substantial decline in the annual number of children acquiring HIV since 2000. However, a recent rise in the number of adults and children newly infected in a few countries shows that insufficient HIV responses lead to rebounding epidemics.

An extraordinary treatment scale-up is continuing, with an estimated 11.4 million people receiving ART in mid-2015. ART coverage reached 41% [38–46%] in 2014, up from less than 1% in 2000. The annual number of people dying from HIV-related causes was almost halved in the past decade. The estimated 790 000 [690 000–990 000] people who died from HIV-related causes in the African Region in 2014 were 48% fewer than the 1.5 million [1.3–1.9 million] people who lost their lives to HIV in 2004, when HIV deaths peaked.

Major challenges remain in this region, which continues to bear by far the greatest HIV burden in the world. Both the coverage and quality of HIV services is insufficient in some large countries with high HIV prevalence.

Although declining, the numbers of people acquiring HIV infection are still high. Young women and adolescent girls continue to be disproportionately at risk of acquiring HIV. Adolescents in general are not being reached sufficiently with prevention and treatment services, and men are less likely than women to take HIV tests or receive HIV treatment. The coverage of ART for children, although improving, is also low and requires concerted improvements.

Region of the Americas

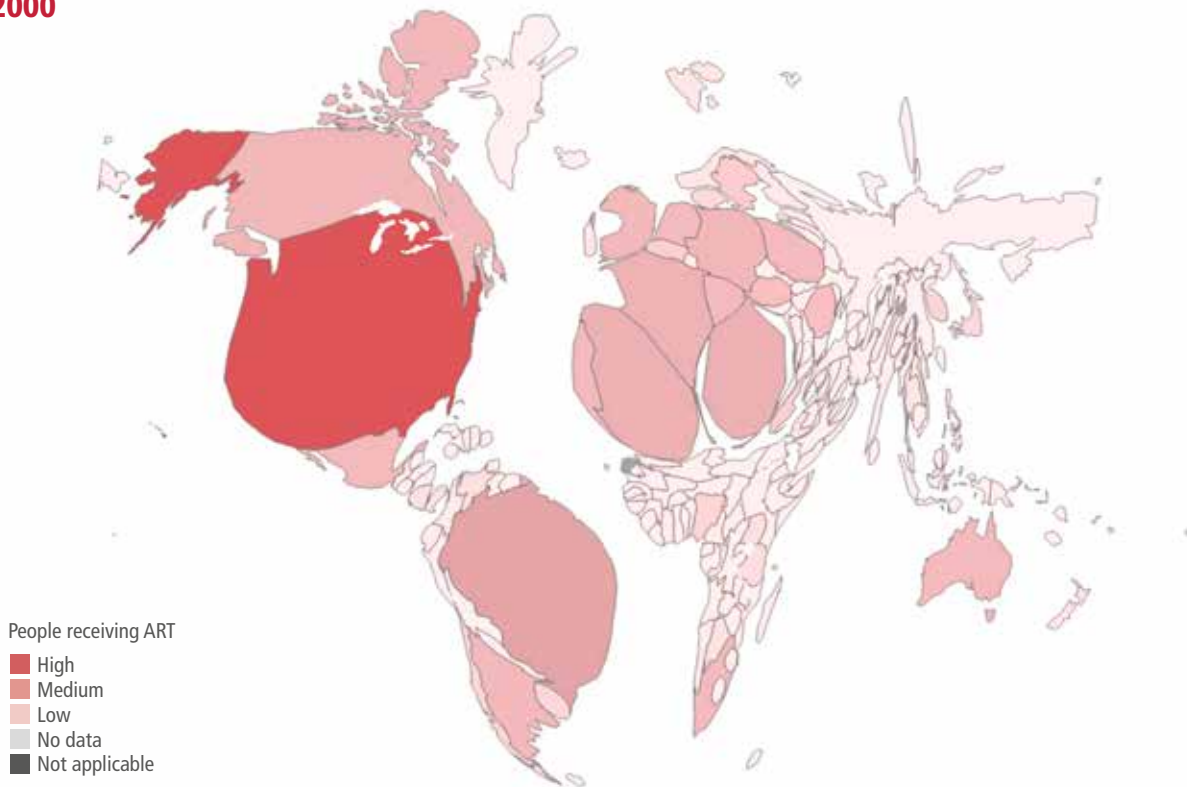
After impressive declines between the mid-1990s and mid-2000s, the annual number of people newly infected with HIV in the Region of the Americas has stayed more or less steady in the past decade. ART coverage in these countries is among the highest in the world, with regional coverage estimated at 46% [35–60%] in 2014. The annual number of people dying from HIV-related causes was reduced by 33% since 2000, to 66 000 [42 000–120 000] in 2014. Most countries in this Region have aligned their national HIV strategic plans with an ambitious set of targets for 2020 and 2030 or are busy doing so. Five countries have already adopted a policy of initiating ART for all people living with HIV, and several more are considering adopting the same approach. In 2015, Cuba became the first low- and middle-income country to validate the elimination of mother-to-child transmission of HIV.

South-East Asia Region

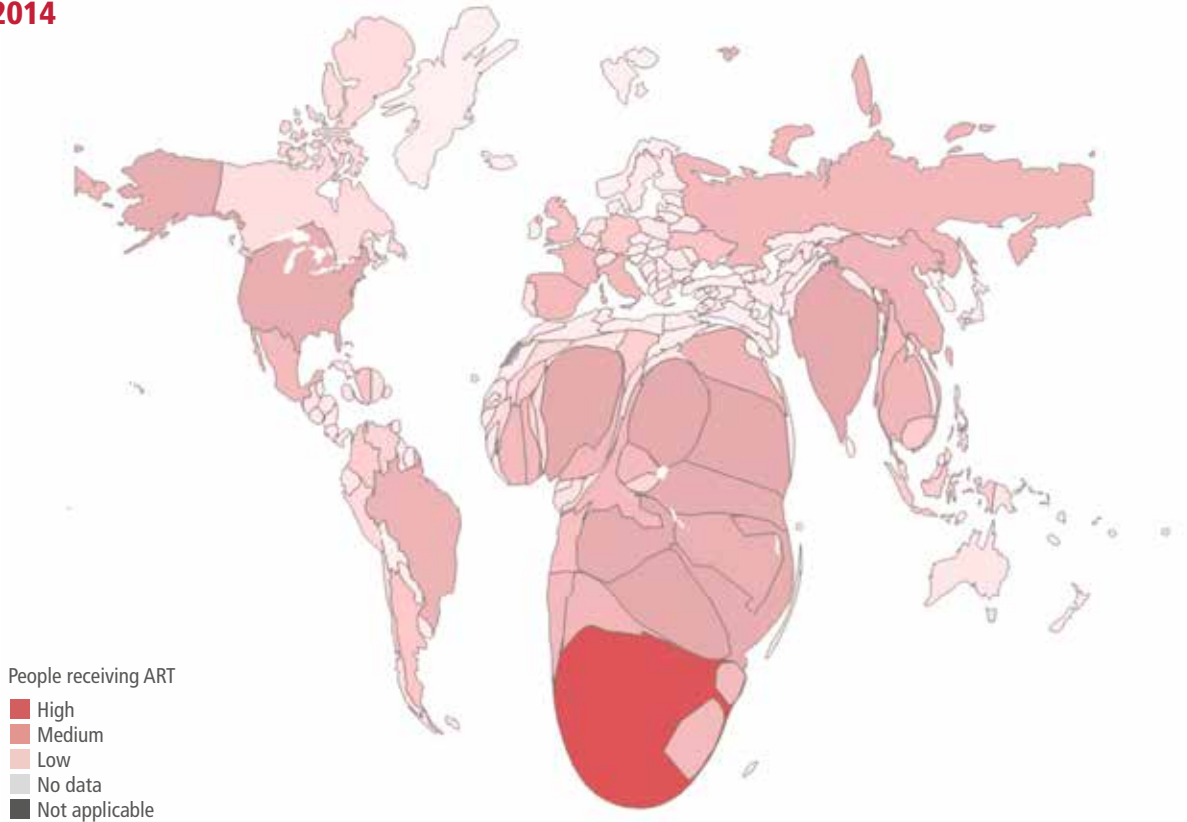
The annual number of people newly infected with HIV in the South-East Asia Region decreased substantially up to 2009 before stabilizing. The number of people dying from HIV-related causes rose significantly until the mid-2000s, when ART became more widely accessible. The approximately 1.2 million people who were receiving ART at the end of 2014 translated to treatment coverage of about 36% [33–38%], slightly less than the global average of 40% [37–45%]. HIV-related deaths declined by about

Fig. 3. Countries with their size proportional to number of people on treatment in 2000 and 2014

2000



2014



Source: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO).

32% from the peak in 2005 to 190 000 [120 000–380 000] in 2014. Thailand, which has adopted a treat-all approach, is close to achieving universal coverage of ART. Overall, intensified efforts are needed in this region to extend the progress made thus far, especially to expand HIV services for key populations and vulnerable groups.

European Region

In contrast to the global trend, the number of people newly infected with HIV has increased in the European Region since 2000, especially in the eastern part of the Region. ART coverage for people living with HIV has increased in recent years but was only 19% [17–22%] in 2014 in the low- and middle-income countries in the region; less than half the global coverage. The estimated annual number of people dying from causes attributable to HIV rose by more than 150% between 2000 and 2014 – from 28 000 [21 000–40 000] to 72 000 [45 000–110 000] – but there has been a slight decline since 2012. Stronger government support for comprehensive HIV responses for key populations is needed to reverse the rise in the number of people newly infected with HIV and to improve treatment coverage and outcomes.

Eastern Mediterranean Region

The annual number of people newly infected with HIV more than doubled in the Eastern Mediterranean Region between 2000 and 2014. Although the number of people receiving ART has increased steadily, the Region had the lowest ART coverage in the world in 2014, at about 10%. The number of people dying from HIV-related causes increased from 3900 [2300–7000] to 15 000 [9800–28 000] between 2000 and 2014. Several

countries in the Region have HIV programmes focusing on key populations, but these have not yet succeeded in reversing the increases in new HIV infections. The challenge is magnified by the fact that some 15 countries in the Region are affected by conflict or have large refugee populations, which place additional strains on HIV responses and health systems. Improving levels of HIV knowledge, especially among key populations, and improved HIV estimates are among the recent, positive developments that are expected to aid the Region's HIV response.

Western Pacific Region

The Western Pacific Region has brought the number of people in key populations newly infected with HIV largely under control with focused interventions. The annual number of people newly infected with HIV in the Region declined substantially up to 2008 and then remained steady at about 95 000. The provision of opioid substitution therapy has substantially contributed to reducing the number of people who inject drugs who acquire HIV in some countries, including China, Malaysia and Viet Nam. The number of people dying from HIV-related causes began declining in the mid-2000s, as provision of ART expanded. ART coverage was an estimated 37% [31–48%] at the end of 2014. HIV-related deaths declined by 27% from their peak of 68 000 [51 000–100 000] in 2005 to 50 000 [37 000–80 000] in 2014. Success in addressing the stigma and discrimination experienced by key populations will help efforts to broaden access for HIV services and link and retain greater numbers of people living with HIV in care.

Closing the remaining gaps and accelerating impact

Remarkable as the achievements of the past 15 years have been, they are shadowed by major unfinished business and formidable challenges. Many countries have made great progress, but some have been unable to sustain early gains and others have failed to curb their HIV epidemics. Almost half the people living with HIV are undiagnosed and are therefore not receiving ART. Treatment is being scaled up unevenly, with some regions and countries lagging considerably.

Closing the remaining gaps in the HIV response will require action and innovation even more impressive than that implemented this far. Nevertheless, the innovations and successes of the past 15 years position the world to shift the global HIV response into higher gear.

Ending the AIDS epidemic by 2030 is the challenge set by the Sustainable Development Goals, which highlight the role of health in averting poverty and facilitating development. Mathematical models show that ending the AIDS epidemic as a public health threat is indeed feasible.

This goal has been crystallized into a set of global Fast-Track targets promoted by the Joint United Nations Programme on HIV/AIDS and WHO. They include:

- a 75% reduction (compared with 2010) in the annual number of people newly infected with HIV, and zero new HIV infections among children;
- reducing the annual number of people dying from HIV-related causes to less than 500 000 by 2020; and
- 90% of people living with HIV know their HIV status, 90% of those diagnosed with HIV have initiated ART, and 90% of the people receiving treatment have suppressed viral loads by 2020.

Despite impressive gains, the rate at which new HIV infections and HIV-related deaths are decreasing needs to accelerate markedly to reach these targets. The gaps are even greater in some countries and regions in which the achievements in the past 15 years have been modest, as shown in this report. Various disparities also mean that

महिला एकता हाई
हाई
HIV/AIDS
विरुद लागौ दाजु
भाई

the benefits of HIV interventions currently are not spread equitably across countries and populations.

Countries need to rapidly increase coverage of high-impact, evidence-based interventions along the entire cascade of services for preventing, diagnosing and treating HIV. They need to do this with an emphasis on reaching the populations and geographical locations with the greatest burden and greatest need, while assuring the quality of the services.

Preventing people from becoming infected

Reducing the number of people newly infected with HIV by 75% by 2020 requires wider and more effective use of combination prevention and bolstering it with new tools and approaches. The number of adolescents and young people acquiring HIV has to be reduced drastically. In Africa, this requires a special focus on using more effective ways to protect adolescent girls and young women from becoming infected with HIV.

Condom use has increased but not consistently enough to realize its full benefits. Uptake of voluntary medical male circumcision in the designated focus countries has increased rapidly, with more than 10 million procedures performed by late 2015 and some countries already reaching the 80% coverage target. Several other countries have opportunities for more rapidly scaling up this intervention. HIV prevention programmes addressing sexual behaviour need to be sustained, including in the African Region, where they have contributed to the decline in the numbers of people acquiring HIV.

The use of ARV medicines as part of combination HIV prevention is a great opportunity to reduce new HIV infections more rapidly. However, realizing the full preventive potential of ARV medicines requires that countries implement a treat-all approach and ensure high levels of treatment adherence. Targeted provision of pre-exposure prophylaxis, in combination with other prevention tools, also has great potential to reduce the number of people newly infected if scaled up strategically among populations at high risk of infection.

Reaching key populations with HIV services

Proven and affordable methods exist for preventing people in key populations¹ from becoming infected, but they are not used widely enough to have a major impact. Legal and social barriers to wider access remain widespread. As a consequence, more than one third of the people newly infected with HIV in 2014 were associated with key populations.

There have been notable successes in preventing HIV infections among female sex workers, frequently as a result of community-based prevention services and initiatives. These need to be supported more strongly and emulated more widely.

Successes in reducing the number of men who have sex with men acquiring HIV are shadowed by rising incidence in some countries despite longstanding prevention and treatment programmes.

Many countries with significant numbers of people who inject drugs are failing to stabilize or reverse HIV transmission associated with drug injecting. Increasing numbers of countries have introduced needle and syringe programmes or opioid substitution treatment, but coverage is generally poor, even in countries with many people who inject drugs and with high HIV prevalence among them.

Eliminating new infections among children

The rate of mother-to-child transmission of HIV in low- and middle-income countries has been cut by more than half since 2000 – from about 37% to 15% in 2014. Some countries in the African Region are approaching the very low mother-to-child transmission rates achieved in high-income countries, but several others lag far behind at the moment. Further progress can be achieved by simplifying and expanding the use of ARV medicines for preventing mother-to-child transmission and protecting pregnant women's own health (option B+: providing lifelong ART to all pregnant and breastfeeding women living with HIV regardless of CD4 count or WHO clinical stage).

Diagnosing more people living with HIV

Drastically reducing the number of people losing their lives to HIV requires successfully shifting to a treat-all approach, as recommended in the latest WHO guidelines. This requires finding more effective and efficient ways of diagnosing much greater numbers of people living with HIV and successfully linking them to treatment and care services.

Almost half the people living with HIV are unaware that they have acquired the virus, and current approaches are not reaching adequate numbers of people in key populations, a situation that has changed little in the past 15 years.

New HIV testing approaches, including self- and community-based testing and new quality-assured testing technologies, hold great promise. The approaches need to match the epidemic of a given country, population and place. Antenatal services account for much HIV testing, which is a major reason why, in all regions, men are less likely than women to undergo HIV testing.

Many people who test HIV-positive drop out of care before starting ART, which leaves an important gap in the cascade of services. Many improvements are available, including strengthening referral procedures and removing unnecessary delays before initiating ART. As more countries move towards initiating ART regardless of CD4 cell count, pre-ART care should become less important and linkage to ART is expected to strengthen.

¹ Key populations are considered to be at very high risk of HIV infection and typically include men and transgender women who have sex with men, sex workers and their clients, and people who inject drugs. Prisoners, migrant workers, certain transport workers and military personnel often are also at high risk for HIV infection.

Reaching more people with HIV treatment

The 15.8 million people receiving ART in mid-2015 ranks among the great public health achievements of recent times. The next challenge is to accelerate treatment access so that ART is available to all people living with HIV. Global coverage of ART increased from about 2% of people living with HIV in 2000 to 40% in 2014 – about halfway to the target set for 2020.

High mortality rates among adolescents living with HIV highlight the need to improve their access and adherence to ART. Sex workers, people who inject drugs, prisoners, transgender people and men and who have sex with men face multiple barriers that deny them the benefits of HIV treatment and care services.

Meanwhile, in the African Region, men eligible for ART in accordance with WHO guidelines are less likely to receive it than women and more likely not to be retained in care. HIV-related mortality rates are also higher among men receiving ART than among their female counterparts in most countries in the African Region.

Maximizing the benefits of HIV treatment requires a systematic approach to close the gaps at each stage of the cascade of HIV services, as shown in this report.

The benefits of ART – both at the individual and population levels – are optimized when people living with HIV start treatment early. Despite a shift toward initiating ART earlier

in all regions over the past decade, many people (especially men and key populations) still enrol in HIV care late, with advanced HIV disease, resulting in poorer treatment outcomes.

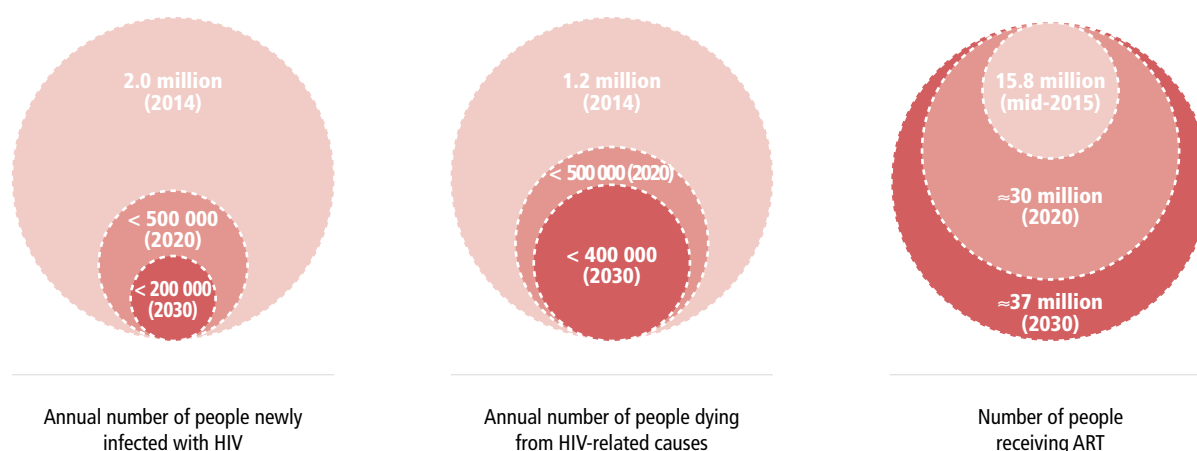
Adopting the treat-all approach recommended by WHO along with simplified referral procedures should enable more people to start ART earlier. In the several countries that have already opted for this approach, coverage of both HIV testing and treatment has improved markedly, as has retention in care.

Achieving good treatment outcomes

The ultimate goal of ART is to suppress HIV to stop the progression of HIV-related disease and drastically reduce the risk of onward transmission. Studies show that very good viral suppression outcomes can be achieved, including in resource-limited settings. However, many people receiving ART drop out of care before achieving or sustaining viral suppression. In recent years, only about 45% of adults who started ART remained virally suppressed after three years.

Services should be organized to minimize leakage and maximize retention and adherence. Every effort must be made to retain more people on ART in care, prevent treatment interruptions, use robust ART regimens, conduct effective HIV drug resistance surveillance and monitor and avoid treatment failure. The emergence of HIV drug resistance must be monitored and addressed.

Fig. 4. Progress required to reach key 2020 and 2030 HIV targets



The next 15 years: towards ending the AIDS epidemic

Strong commitment, supportive partnerships and major innovations in technologies and service delivery have brought the world to a point where ending the AIDS epidemic as a serious public threat by 2030 is a realistic prospect.

Reaching that goal will require actions that can reduce the number of people newly infected with HIV and dying from HIV-related causes even more rapidly than in the past 15 years. Against the backdrop of a broad, multisectoral response, the health sector will play a vitally important role.

The proposed Global Health Sector Strategy on HIV 2016–2021 maps the way forward along five strategic directions:

- using accurate strategic information to understand HIV epidemics and focus responses;
- defining the essential packages of high-impact HIV interventions along the continuum of HIV services;
- effectively delivering the cascade of HIV services to different populations and locations to achieve equity, maximize impact and ensure quality;
- implementing sustainable funding models for HIV responses and reducing costs; and
- innovating new HIV technologies and ways of organizing and delivering services.

Based on reviews of the latest evidence, WHO has also adapted its treatment, testing and strategic information guidelines to provide a package of support that can guide accelerated implementation at each stage of the cascade of services. The priority actions and approaches outlined in the proposed strategy and in WHO's technical guidance will be crucial for meeting the major challenges that lie ahead.

Doing more, more rapidly and more effectively

The world has arrived at a critical juncture. The remarkable impact of the public health response to the HIV epidemic has defied most expectations. Nevertheless, more has to be done, more rapidly and more effectively to end the AIDS epidemic.

The great advantage today is the wealth of experiences and lessons learned during the past 15 years, the array

of powerful tools and proven methods that exist, the partnerships that have been built, and the evident success of so many key innovations, especially in the African Region.

If countries use these experiences, tools and resources to the full, they will be able to forge a sustainable path to end AIDS within this generation and to help achieve the aims and realize the spirit of the Sustainable Development Goals.



INTRODUCTION: THE GLOBAL IMPACT OF THE HIV RESPONSE

The global public health response to HIV of the past 15 years has had a remarkable impact. Spanning prevention, treatment and care services, it has transformed the lives and well-being of many millions of people around the world and has brought within reach the prospect of ending the AIDS epidemic as a serious threat to public health.

When the “3 by 5” initiative was launched in 2003 with the aim of getting antiretroviral therapy (ART) to 3 million people by 2005 in low- and middle-income countries, many argued that ART could not be provided on such a large scale in places with limited resources. Yet that target was reached in 2008. The number of people receiving HIV treatment in low- and middle-income countries then doubled by the end of 2009 and then doubled again by the end of 2014.

Globally, 15.8 million people were receiving ART by mid-2015, many of them in communities far from central hospitals. Prevention programmes were expanded and enhanced with new methods and innovations and reached into marginalized communities and remote areas.

The impact was immense: between 2000 and 2014, the number of people dying from HIV-related causes was reduced by one quarter, the number of people newly infected was cut by more than one third and the number of children newly infected declined by almost 60%.

This report reviews and assesses the remarkable progress made in the global health sector response to HIV since 2000. It shows the impact of 15 years of a sustained global public health effort that marshals the resources and resolve of public health, community, private, civil society, donor and government partners in a strategic manner.

Each region has contributed to shaping the global response – from early scale-up of treatment in Brazil to large-scale prevention programmes in Cambodia, Thailand and Uganda and effective interventions for key populations in the Region of the Americas and in the European, South-East Asia and Western-Pacific Regions, many of the interventions led or inspired by civil society groups. They are among the many dozens of national responses that helped to bring the global public health response to HIV to the point where ending the AIDS epidemic is in sight.

The report especially highlights how countries in the African Region – which continues to bear by far the greatest HIV burden – have transformed their HIV responses. Supported by partners around the world, HIV programmes in Africa beat the odds to achieve remarkable results. They did this by devising ways to deliver services deep into communities where they could make a difference in people’s lives.

Although focusing on major breakthroughs in the African Region and elsewhere, the report also analyses the gaps and deficiencies that remain and identifies the improvements that are needed – for the progress of the past 15 years does not mean the job is done.

Almost half the people living with HIV in the world remain undiagnosed, and about 60% of the people living with HIV are not receiving treatment. Only in the African Region has the number of people newly infected with HIV continued to decline in the past five years. In some regions, the HIV infection rates among men who have sex with men are increasing, and in most regions, coverage of harm reduction services is too low to affect the epidemic. Indeed, there are major gaps and challenges, some of them new, all along the cascade of HIV prevention, testing, treatment and care services. They have to be overcome.

The report is divided into three main sections.

Chapter 1 assesses global and regional progress against key indicators, focusing on the results that are being achieved. It highlights the impact on HIV-related deaths, new HIV infections, life expectancy and HIV transmission from mothers to children, and it shows how the impact has been achieved. It also contrasts this progress against key HIV targets for 2020 and 2030 to identify the main challenges ahead.

Chapter 2 reviews each stage of the cascade of HIV services, their current status, the main gaps and the key action needed to further reduce the numbers of people dying and newly infected with HIV. This cascade framework echoes the approach adopted in WHO’s latest strategic information, testing and treatment guidelines.

Chapter 3 looks ahead to the next 15 years, focusing on the challenge of reducing the number of people newly infected decisively enough to put the response on a sustainable path to end the HIV epidemic. Drawing on the proposed WHO Global Health Sector Strategy on HIV 2016–2021, it presents the core enabling improvements countries need in order to advance the sustainable development agenda and end the AIDS epidemic in our lifetime.

The world has arrived at a crucial point in the global HIV response, with huge opportunities for learning from 15 years of innovation in implementation and for applying this knowledge and experience to the next 15 years. By critically assessing the progress made, pinpointing the main challenges that remain and identifying the actions that can overcome them, it is hoped that this report will assist countries as they strive toward the goal of ending the AIDS epidemic by 2030.



CHAPTER 1

FIFTEEN YEARS OF PROGRESS IN THE GLOBAL HIV RESPONSE

This chapter reviews the results achieved over the past 15 years, focusing on the global and regional impact of the public health response to HIV. It also discusses the key innovations, especially those in the WHO African Region, that led to these accomplishments.

In this chapter

1.1 SHIFTING THE COURSE OF THE HIV EPIDEMIC

- 1.1.1 Reducing the number of people newly infected with HIV
- 1.1.2 Reducing HIV transmission from mothers to children
- 1.1.3 Reducing the number of people dying from HIV-related causes

1.2 HOW THE IMPACT HAS BEEN ACHIEVED

- 1.2.1 Political commitment and partnerships were focused on targets
- 1.2.2 A public health approach was put into practice
- 1.2.3 Civil society extended the HIV response into communities
- 1.2.4 Funding was mobilized and costs were reduced
- 1.2.5 Innovations in science and implementation were widely used
- 1.2.6 Data improved and increasingly drove decisions

1.3 A PLATFORM FOR ENDING THE AIDS EPIDEMIC

- 1.3.1 A set of decisive targets lies ahead ...
- 1.3.2 ... But a big divide remains
- 1.3.3 Action for closing the gaps

Achieving the HIV targets requires that countries rapidly increase coverage of high-impact, evidence-based interventions along the entire cascade of services for preventing, diagnosing and treating HIV and focus especially

on reducing the number of people newly infected with HIV by 75% (compared with 2010). They will need to do this while emphasizing reaching the populations and geographical locations with the greatest need and assuring quality.

1.1 Shifting the course of the HIV epidemic

In 2000, an estimated 3.1 million [3.0 – 3.3 million] people globally acquired HIV and 1.6 million [1.3 – 2.1 million] people died from HIV-related causes. The global public health response to the epidemic was divided and uneven.

Prevention programmes were reducing the number of people newly infected in some key countries, but the global number of people living with HIV was rising. In western Europe, North America, Australia, Brazil and New Zealand, HIV treatment was saving many thousands of lives, yet it was barely reaching countries in Africa and Asia. In the entire WHO African Region, for example, hardly any of the almost 21 million people living with HIV in 2000 were receiving antiretroviral therapy (ART), and the situation was similar in the WHO South-East Asia Region and Western Pacific Region, where about 4 million people were living with HIV. Sceptics argued that the high cost of medicines and insufficient health sector capacity hindered the delivery of HIV treatment at scale across the world.

Fifteen years later, the public health response to HIV has been transformed into a largely successful, global public health response covering prevention, testing, treatment and care. Successful HIV programmes are not yet universal, but they are operating in an increasing number of countries across the globe, often reaching into remote and marginalized communities – from Brazil to Cambodia

to Malawi, from sex workers in the Dominican Republic, India and Senegal, to people who inject drugs in China, Lebanon and Ukraine and to men who have sex with men in Argentina, Australia and the Bahamas.

Today, the HIV response is bringing treatment to many millions of people, delivering life-saving services to remote communities and enabling people to use and benefit from those services. The annual number of people acquiring HIV infection globally has been reduced to the lowest level in more than 20 years, and the number of people dying from HIV-related causes has been reduced by more than 40% in the past decade. Almost 16 million people are receiving HIV treatment, more than 11 million of them in the WHO African Region, where only about 11 000 people were receiving ART 15 years ago.

The global health response to HIV represents one of the great public health feats of recent times. It is the result of enormous resolve and far-sighted innovations. Much of it was pioneered or taken to scale in the African Region (Box 1.2).

This feat made it possible at a global level to reach Millennium Development Goal 6, which called for halting and beginning to reverse the spread of HIV by 2015. The HIV response also contributed to reducing child mortality

(Millennium Development Goal 4), reducing maternal mortality (Millennium Development Goal 5) and to creating innovative development partnerships between government, civil society and the private sector (Millennium Development Goal 8).

However, the experiences have varied greatly between countries. Many have made considerable progress, but

some have been unable to sustain early successes and others have failed to curb their HIV epidemics. Growing epidemics are underway in several countries, partly hidden in globally aggregated HIV data. Similar variation occurs within countries. These realities highlight the importance of understanding and acting on HIV epidemics at the local level, which will be especially crucial for the next phase of the HIV response.

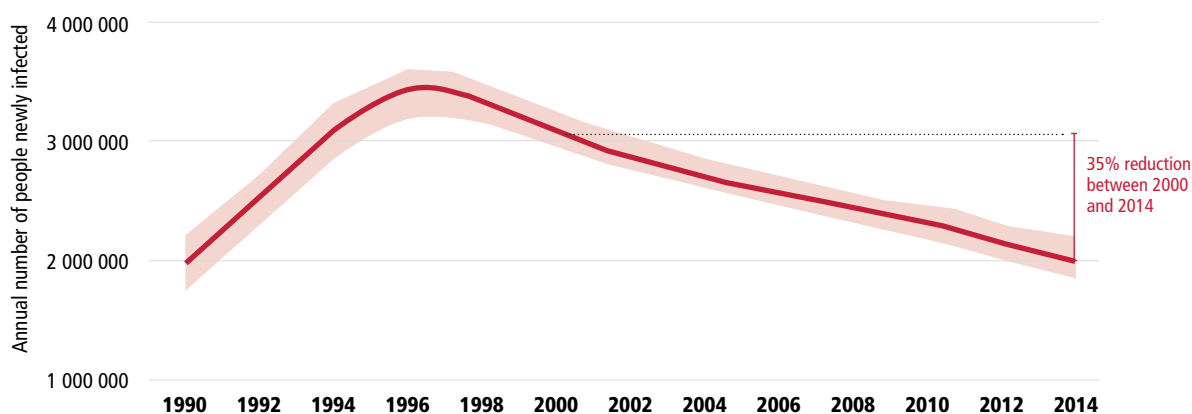
1.1.1 Reducing the number of people newly infected with HIV

Millennium Development Goal 6 has been achieved. Globally, the annual number of people acquiring HIV infection has been reduced by 35% since 2000, and 30 million people have avoided acquiring HIV infection.

The estimated 2 million [1.9 – 2.2 million] people newly infected with HIV globally in 2014 was the lowest number since 1990 (Fig. 1.1) and 35% fewer than the 3.1 million in 2000. This decline means that the world achieved Millennium Development Goal 6 – “To halt and begin to reverse the spread of HIV by 2015”. Importantly, the number of people 15–24 years old acquiring HIV infection globally has declined from an estimated 980 000 [930 000–1 020 000] to 620 000 [560 000–680 000] since 2000. Overall, an estimated 30 million people have avoided acquiring HIV infection in the past 15 years.

A great deal of this achievement stems from progress in the WHO African Region, where 41% fewer people acquired HIV infection from 2000 to 2014 – from an estimated 2.3 million [2.2 – 2.4 million] to 1.4 million [1.2 – 1.5 million] (Fig. 1.2). In some countries with great burdens of HIV infection, the number of people newly infected since 2000 has dropped even more steeply: at least 75% fewer in Burundi, more than 50% fewer in Botswana, Côte d’Ivoire, Ghana, Malawi, the United Republic of Tanzania and Zimbabwe and more than 40% fewer in Namibia, South Africa (which still has the world’s largest HIV epidemic) and Swaziland. However, there are exceptions: since 2000, the annual number of people acquiring HIV infection increased by 28% in Angola, by 52% in Mali and by 42% in Uganda. When HIV responses are insufficient, the epidemic rebounds.

Fig. 1.1 Estimated annual number of people newly infected with HIV globally (with upper and lower uncertainty bounds), 1990–2014



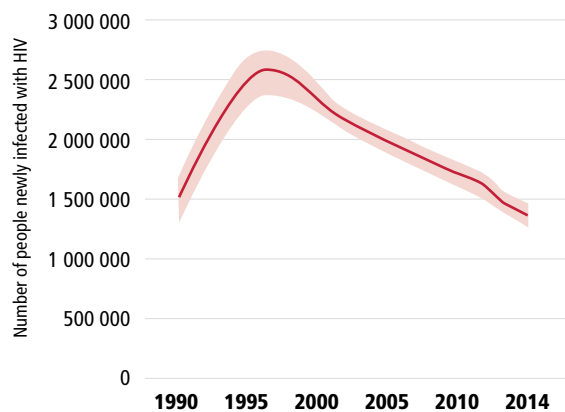
Source: UNAIDS/WHO estimates.

The WHO Region of the Americas consolidated impressive progress made between the mid-1990s and mid-2000s, but the annual number of people acquiring HIV infection remained more or less constant in the past decade (Fig. 1.2). Similarly, the number of people newly infected in the South-East Asia Region and Western Pacific Region declined substantially up to 2009, but these decreases were not sustained. In the Eastern Mediterranean Region and in the European Region, more people have acquired HIV infection during the past 15 years. Notably, the African Region is the only WHO region recording a consistent drop in the number of

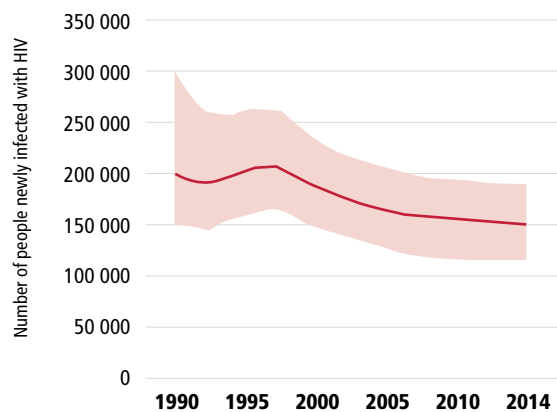
people newly infected since 2010. There is considerable variation within the WHO regions, however. In the Region of the Americas, for example, the steep drop in the number of people newly infected during 2000–2014 in the Dominican Republic contrasts with a sharp rise in Cuba. During the same period, the number of people newly infected in the South-East Asia Region increased by five times in Indonesia but decreased by two thirds in Thailand. Regional averages are useful, but they should not hide the fact that some country epidemics have been contained while others are re-emerging or growing anew.

Fig. 1.2 Estimated annual number of people newly infected with HIV by WHO region by year (with upper and lower uncertainty bounds), 1990–2014

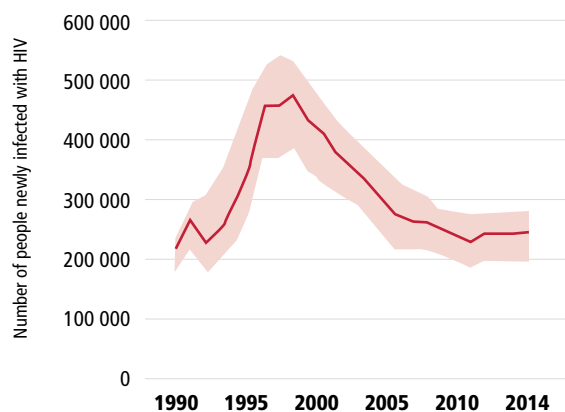
African Region



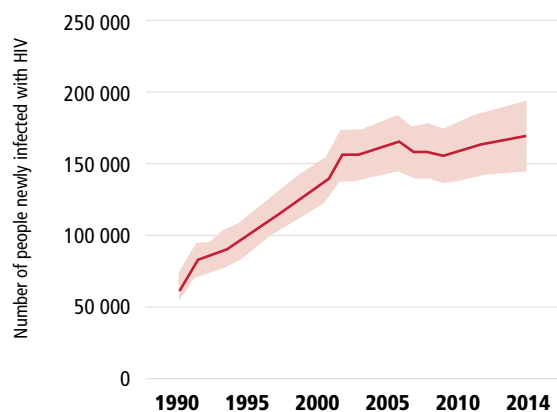
Region of the Americas



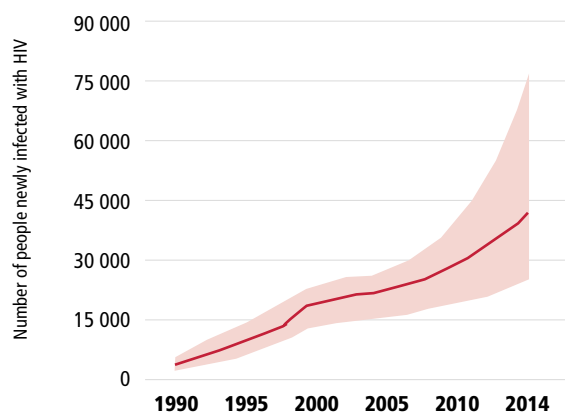
South-East Asia Region



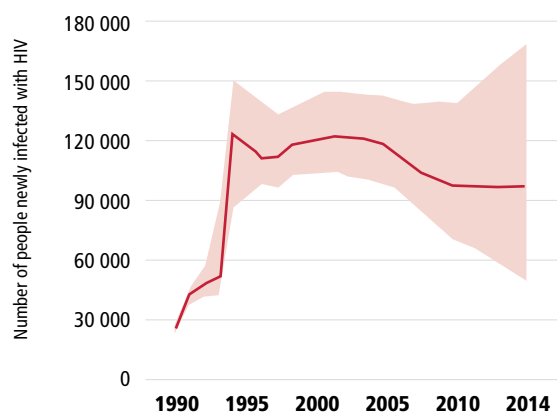
European Region



Eastern Mediterranean Region



Western Pacific Region



1.1.2 Reducing HIV transmission from mothers to children

The number of children (0–14 years old) acquiring HIV infection globally has been reduced by 58% since 2000 and by 45% since 2009, with a large majority of these gains occurring in the WHO African Region.

Programmes to prevent the mother-to-child transmission of HIV prevented about 1.4 million children from acquiring HIV infection globally in the last 15 years, about 1.2 million of them in the African Region.

The number of children (0–14 years old) newly infected globally declined by 58% from 2000 to 2014, from an estimated 520 000 [470 000–580 000] to about 220 000 [190 000–260 000] (Fig. 1.3).

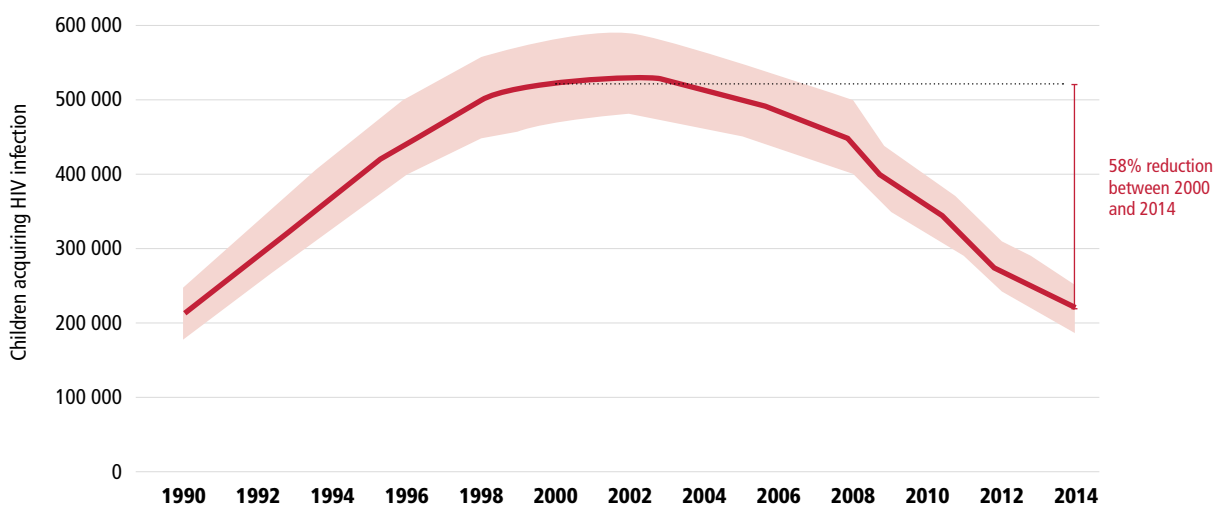
This progress has been achieved in two waves.

After countries began implementing programmes for preventing the mother-to-child transmission of HIV (PMTCT) in the early 2000s, the number of children

newly infected globally fell by 24% between 2000 and 2009. The launch of the Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive (1) in 2011 intensified PMTCT efforts markedly, especially in the 21 priority countries in the African Region, which accounted for about 83% of the children acquiring HIV globally at that time.

South Africa made the strongest progress (with 76% fewer children acquiring infection in 2014 compared with 2009, the baseline for the Global Plan), followed by the United Republic of Tanzania (72%), Uganda and Mozambique (69% each), Ethiopia (65%), Namibia (64%) and Swaziland (63%). Some countries with a high burden of HIV infection (including Botswana, Burundi, Namibia and Swaziland) made remarkable progress, as they moved towards eliminating mother-to-child transmission of HIV as a public health problem.

Fig. 1.3 Estimated annual number of children (younger than 15 years) newly infected with HIV globally (with upper and lower uncertainty bounds), 1990–2014



Source: UNAIDS/WHO estimates.

Outside the African Region, very low rates of mother-to-child transmission of HIV have been achieved, and the agenda is moving towards achieving the elimination of mother-to-child transmission of both HIV and syphilis. In mid-2015, Cuba became the first low- and middle-income country to formally validate the elimination of mother-

to-child HIV transmission, and several other countries are expected to match that achievement (2).

Overall, PMTCT programmes prevented an estimated 1.4 million children from acquiring HIV infection globally during 2000–2014, about 1.2 million of them in the African Region.

¹ The Global Plan identified 21 priority countries in the WHO African Region: Angola, Botswana, Burundi, Cameroon, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia and Zimbabwe.

1.1.3 Reducing the number of people dying from HIV-related causes

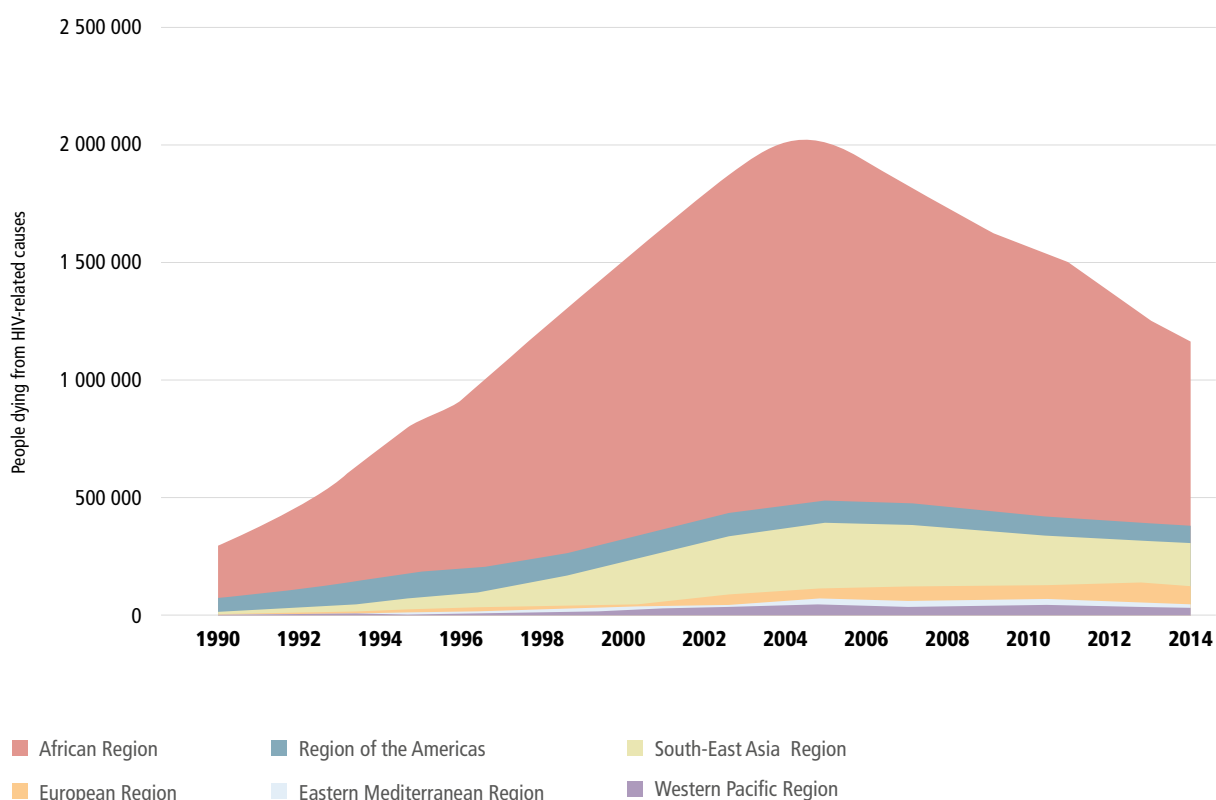
HIV treatment prevented an estimated 7.8 million people from dying globally between 2000 and 2014.

Globally in 2014, 24% fewer people died from HIV-related causes than in 2000 and 42% fewer than in 2004, when HIV-related deaths peaked.

Mortality has risen among adolescents living with HIV, however, and disparities in treatment access are limiting its impact among key populations.

The HIV epidemic claimed an estimated 1.6 million [1.3 – 2.1 million] lives in 2000, with about 78% of these people dying in the African Region. By the time the global effort to rollout HIV treatment began gathering momentum in 2004, the estimated annual number of people dying from HIV-related causes exceeded 2 million. From that point onward, improved access to ART led to a sharp and ongoing drop in the number of adults, adolescents and children dying from HIV-related causes. The estimated 1.2 million [980 000–1 600 000] lives lost to HIV in 2014 were 24% fewer than 2000 and 42% fewer compared with the peak in 2004 (Fig. 1.4).

Fig. 1.4 Estimated number of people dying from HIV-related causes by WHO region by year, 1990–2014

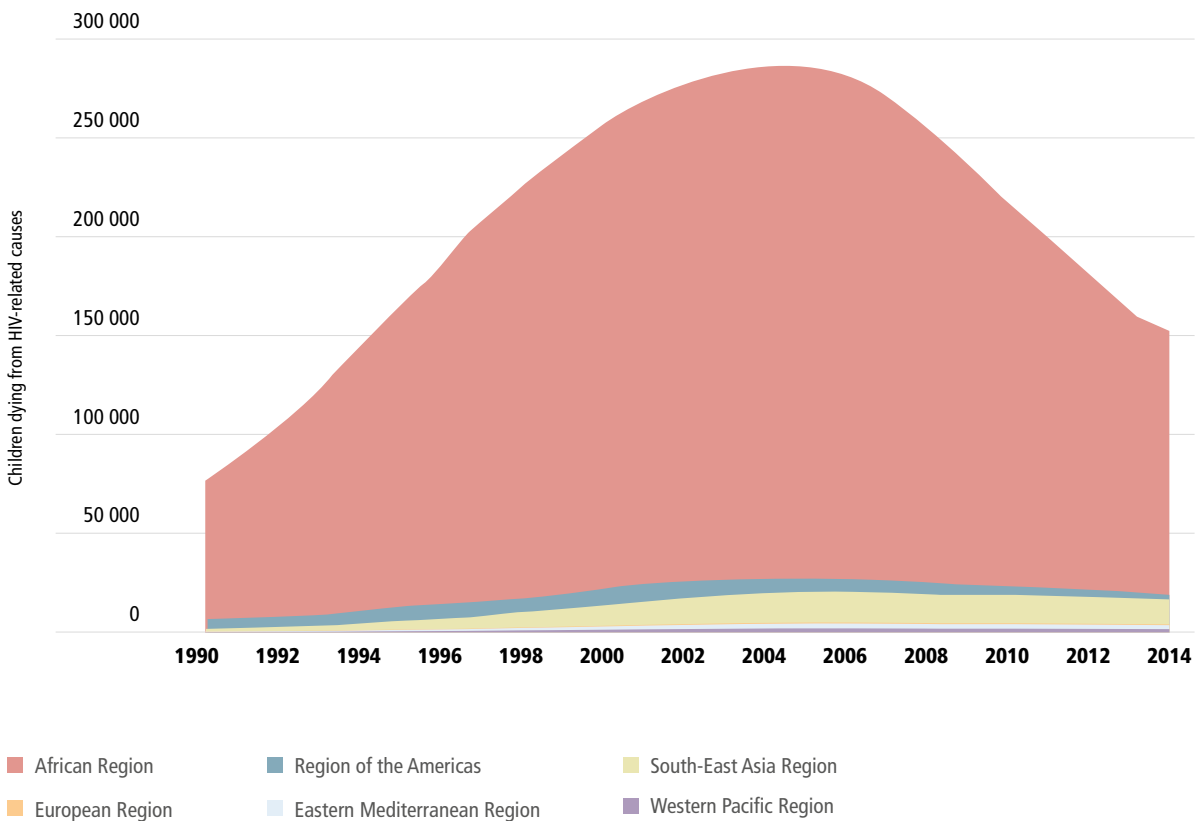


Source: UNAIDS/WHO estimates.

HIV-related deaths among children (younger than 15 years) have declined at an even quicker rate than among adults. The estimated 150 000 [140 000–170 000] children who died from HIV-related causes in 2014 were 42% fewer than in 2000 and 47% fewer than in 2004, when HIV-related deaths among children peaked (Fig. 1.5). This ongoing success has largely resulted from PMTCT programmes in the African Region.

Nevertheless, increases in the number of adolescents (10–19 years old) dying from HIV-related causes indicate that ART services are inadequate for this age group (3). HIV is the leading cause of death in the African Region and the second most common cause of death globally among adolescents (4).

Fig. 1.5 Number of people younger than 15 years dying from HIV-related causes by WHO region by year, 1990–2014



Source: UNAIDS/WHO estimates.

The decline in HIV-related mortality has been especially sharp in the African Region, where the number of people dying from HIV-related causes was nearly halved in the past decade (Fig. 1.6). The estimated 790 000 [690 000–990 000] people in the African Region who died from HIV-related causes in 2014 were 48% fewer than the 1.5 million [1.3 – 1.9 million] people who lost their lives to HIV in 2004.

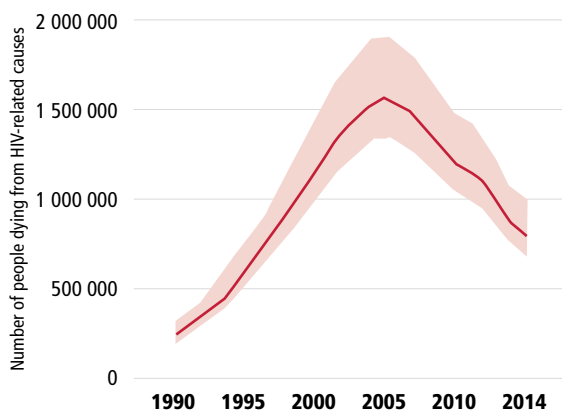
The Region of the Americas made early inroads against HIV, with the number of people dying from HIV-related causes falling 46% since peaking in 1995 and 33% since 2000, to 66 000 [42 000–120 000] in 2014. In the South-East Asia Region and Western Pacific Region, HIV-related deaths increased significantly until the mid-2000s, when ART became more widely accessible. Since then, the number of people dying from HIV-related causes declined by about 32% in the South-East Asia Region to 190 000 [120 000–380 000] and by 27% in the Western Pacific Region to 50 000 [37 000–80 000] in 2014.

An opposite trend played out in the European Region where the estimated number of people dying from HIV-related causes rose by more than 150% between 2000 and 2014, although declining slightly since 2012. There the HIV epidemic claimed the lives of an estimated 72 000 [45 000–110 000] people in 2014 versus 28 000 [21 000–40 000] in 2000. In the Eastern Mediterranean Region, the number of people dying from HIV-related causes increased from 3900 [2300–7000] to 15 000 [9800–28 000] during the same period.

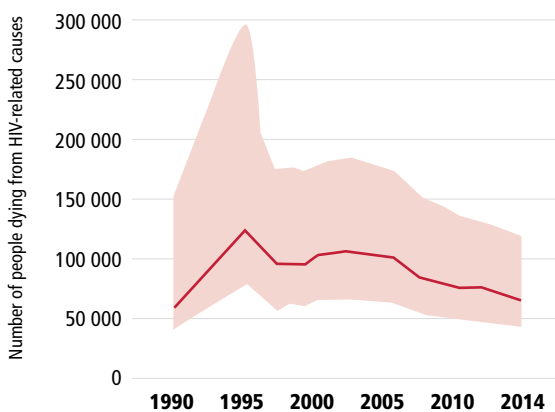
As with new HIV infections, these regional averages can obscure important contrary trends in some countries. In the African Region during 2000–2014, for example, HIV-related deaths increased significantly in some countries with a high burden of HIV infection, including Angola, Cameroon, Mozambique and Nigeria. HIV-related deaths also increased steeply in Indonesia (South-East Asia Region), Pakistan (Eastern Mediterranean Region), Guatemala (Region of the Americas), the Lao People's Democratic Republic and the Philippines (Western Pacific Region) and Uzbekistan (European Region), for example.

Fig. 1.6 Estimated number of people dying from HIV-related causes by WHO region by year (with upper and lower uncertainty bounds), 1990–2014

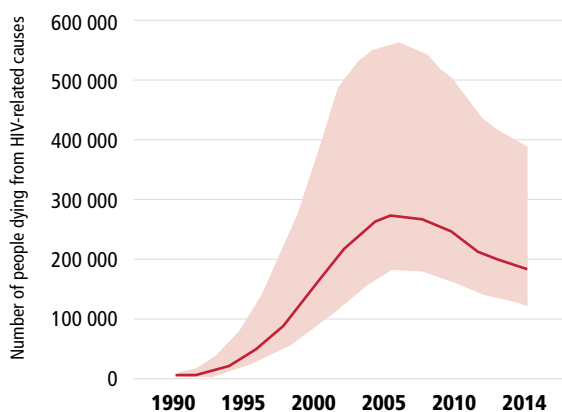
African Region



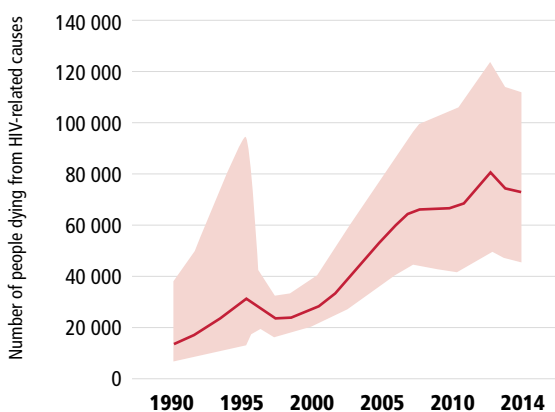
Region of the Americas



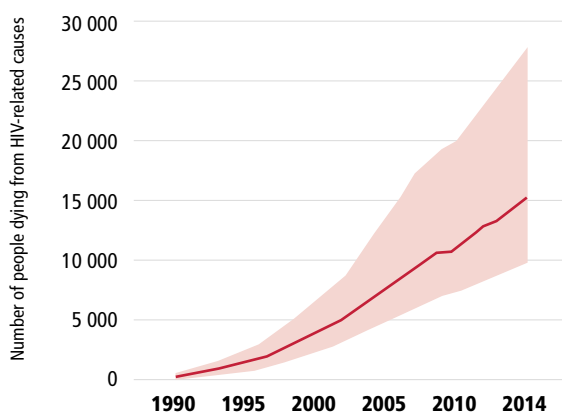
South-East Asia Region



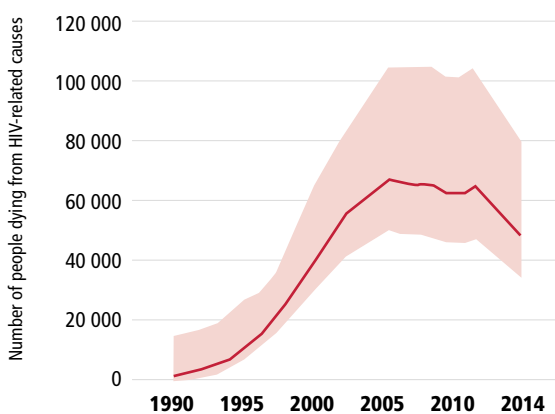
European Region



Eastern Mediterranean Region



Western Pacific Region

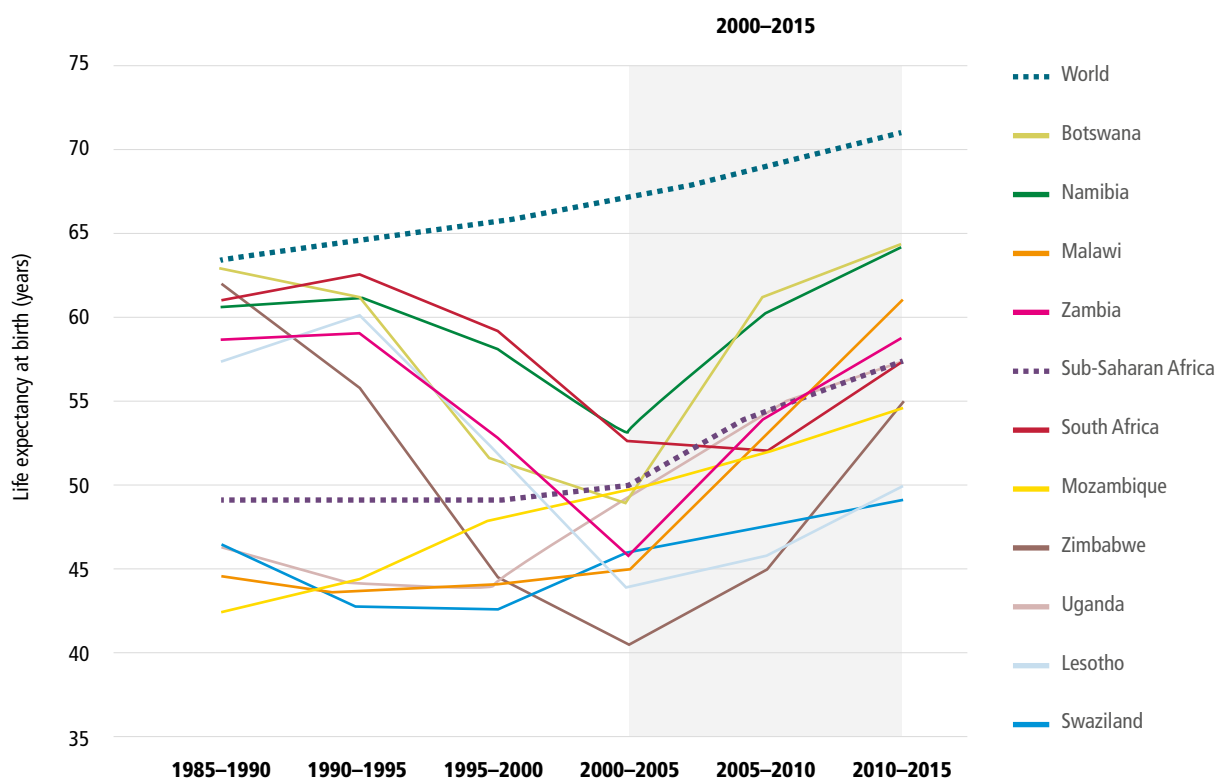


Nevertheless, the overall impact of HIV treatment programmes has been massive: an estimated 7.8 million HIV-related deaths were averted between 2000 and 2014. As a result, life expectancy has increased substantially in several countries with a very great burden of HIV infection (Fig. 1.7). In South Africa, which now has more people receiving ART than any other country, life expectancy at birth for women rose from 54 years in 2005 to 63 years

in 2014 and from 50 years to 59 years for men. (5). In the United Republic of Tanzania, life expectancy at birth for women rose from 52 years in 2002 to 61 years in 2011 and from 51 years to 58 years for men (6).

Arguably no other public health intervention this century has had as quick and dramatic an impact on individual and population health outcomes as the scale up of ART.

Fig. 1.7 Changes in life expectancy at birth in selected countries in the WHO African Region with a high burden of HIV infection, 1985–2015



Source: United Nations, Department of Economic and Social Affairs, Population Division (2015). World Population Prospects: The 2015 Revision.

Improvements in the HIV response have also benefited other vital public health services. Integration of HIV and tuberculosis (TB) services reduced the annual number of people dying from HIV-associated TB globally from 500 000 [460 000–530 000] in 2000 to 390 000 [350 000–430 000] (7)—a 22% decline in 2014.

By 2014, 17 of the 41 countries with the highest burden of HIV and TB coinfection are estimated to have met the target

of reducing the number of people dying from HIV-associated TB by at least 50%. This is the result mainly of important improvements in the reach, quality and linking of HIV and TB services (7). Despite these achievements, TB remains a leading cause of HIV-associated hospitalization and of death among people living with HIV worldwide (8). TB accounted for 31% of the estimated 1.2 million HIV-related deaths globally in 2014 (Boxes 1.1 and 1.2).

Box 1.1 How HIV treatment saved almost 8 million lives

Enormous resolve and inventiveness enabled the world to increase the number of people receiving ART from fewer than 700 000 in 2000 to 15.8 million in mid-2015. This would have been impossible without a successful push to drive down the prices of ARV medicines and to simplify delivery.

At more than US\$ 10 000 per person per year in 2000, the cost of HIV treatment was out of reach for most people living with HIV. Scepticism about the feasibility of using ART in countries with weak health systems also stood in the way of equitable access (9).

This contradiction – increasing numbers of people dying despite the existence of effective treatment – fuelled a groundswell of social activism and community mobilization that quickly grew into an international treatment advocacy movement. This movement successfully pushed for a succession of breakthroughs that transformed the HIV landscape in the early 2000s.

In 2000, about 690 000 of the estimated 28.6 million [26.4 – 31.2 million] people living with HIV worldwide were receiving ART, most of them in high-income countries; the exception was Brazil, which was the first low- and middle-income country to introduce free ART through the public sector. About 93% of the people receiving ART lived in North America, western Europe and Brazil. ART in the WHO African Region was limited to a very small minority of people who could afford private health care (Table 1.1).

Concerted pressure and increased manufacturing competition drove down the prices of ARV medicines, while funding and other support, including from the newly created Global Fund to Fight AIDS, Malaria and Tuberculosis and the United States President's Emergency Plan for AIDS Relief (PEPFAR), made large treatment programmes increasingly feasible. The situation changed rapidly, with the global total of people receiving ART doubling every three to four years since 2000. The estimated 2.2 million people receiving ART globally at the end of 2005 represented a 200% increase in five years (10). By 2010, the total number of people receiving treatment exceeded 7.5 million, and by 2014 it had almost doubled again, to reach 14.9 million, and 15.8 million in mid-2015.

At the end of 2014, about 40% of the people living with HIV were receiving ART; in the African Region, which is home to 70% of people living with HIV globally, ART coverage was 41% [38–46%]. More than 3 million people in South Africa were receiving ART at the end of 2014, the largest treatment program in the world. In the African Region overall, people living with HIV are now more likely to receive HIV treatment than their peers in any other WHO region except the Region of the Americas.

Table 1.1 Number of people receiving antiretroviral therapy, estimated number of people living with HIV and estimated coverage of antiretroviral therapy globally and by WHO region in 2000, 2005, 2010 and 2014

	2000			2005			2010			2014		
	Number of people on ART	Estimated number people of living with HIV	ART coverage (%)	Number of people on ART	Estimated number people of living with HIV	ART coverage (%)	Number of people on ART	Estimated number people of living with HIV	ART coverage (%)	Number of people on ART	Estimated number people of living with HIV	ART coverage (%)
African Region	10 700	20 800 000	0	731 600	22 700 000	3	4 658 500	24 200 000	19	10 686 000	25 800 000	41
		[19 000 000 – 22 700 000]	[0–0]		[21 100 000 – 24 500 000]	[3–3]		[22 500 000 – 25 900 000]	[18–21]		[24 000 000 – 28 700 000]	[38–46]
Region of the Americas	444 600	2 500 000	18	844 300	2 800 000	30	1 322 800	3 100 000	43	1 550 100	3 400 000	46
		[1 900 000 – 3 400 000]	[13–24]		[2 100 000 – 3 700 000]	[23–40]		[2 300 000 – 4 100 000]	[33–57]		[2 500 000 – 4 400 000]	[35–60]
Eastern Mediterranean Region	<500	100 000	0	2 700	170 000	2	13 400	240 000	6	31 600	330 000	10
		[54 000 – 150 000]	[0–1]		[99 000 – 230 000]	[1–2]		[150 000 – 330 000]	[3–8]		[200 000 – 460 000]	[6–14]
European Region ^a	3 500	620 000	1	15 600	1 000 000	2	123 100	1 300 000	9	297 300	1 600 000	19
		[540 000 – 730 000]	[0–1]		[900 000 – 1 200 000]	[1–2]		[1 200 000 – 1 500 000]	[8–11]		[1 400 000 – 1 800 000]	[17–22]
South-East Asia Region	840	3 200 000	0	134 500	3 500 000	4	646 600	3 400 000	19	1 244 600	3 500 000	36
		[3 100 000 – 3 300 000]	[0–0]		[3 300 000 – 3 700 000]	[4–4]		[3 200 000 – 3 600 000]	[18–20]		[3 200 000 – 3 700 000]	[33–38]
Western Pacific Region	11 600	840 000	1	65 100	1 100 000	6	237 600	1 300 000	19	523 900	1 400 000	37
		[710 000 – 1 100 000]	[1–2]		[960 000 – 1 300 000]	[5–7]		[1 100 000 – 1 500 000]	[16–22]		[1 200 000 – 1 800 000]	[31–48]
GLOBAL TOTAL	687 000	28 600 000	2	2 161 000	32 000 000	7	7 520 000	34 400 000	22	14 858 000	36 900 000	40
		[26 400 000 – 31 200 000]	[2–3]		[29 900 000 – 34 500 000]	[6–7]		[32 100 000 – 36 900 000]	[20–24]		[34 300 000 – 41 400 000]	[37–45]

Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS/WHO estimates.

^aThe data for the European Region are for low- and middle-income countries. Estimates for high-income countries in the European Region are currently under review.

1.2 How the impact has been achieved

This section presents some of the core factors that have led to the creation of a coherent and increasingly effective public health response to HIV around the world.

A powerful global public health response has been built. It has mobilized political commitment and forged new

partnerships around clear targets, harnessed a civil society movement for advocacy and implementation and developed a strong package of services, guidance and country support to get the work done. At the heart of these achievements lie common features that enabled the health sector response to HIV to be transformed.

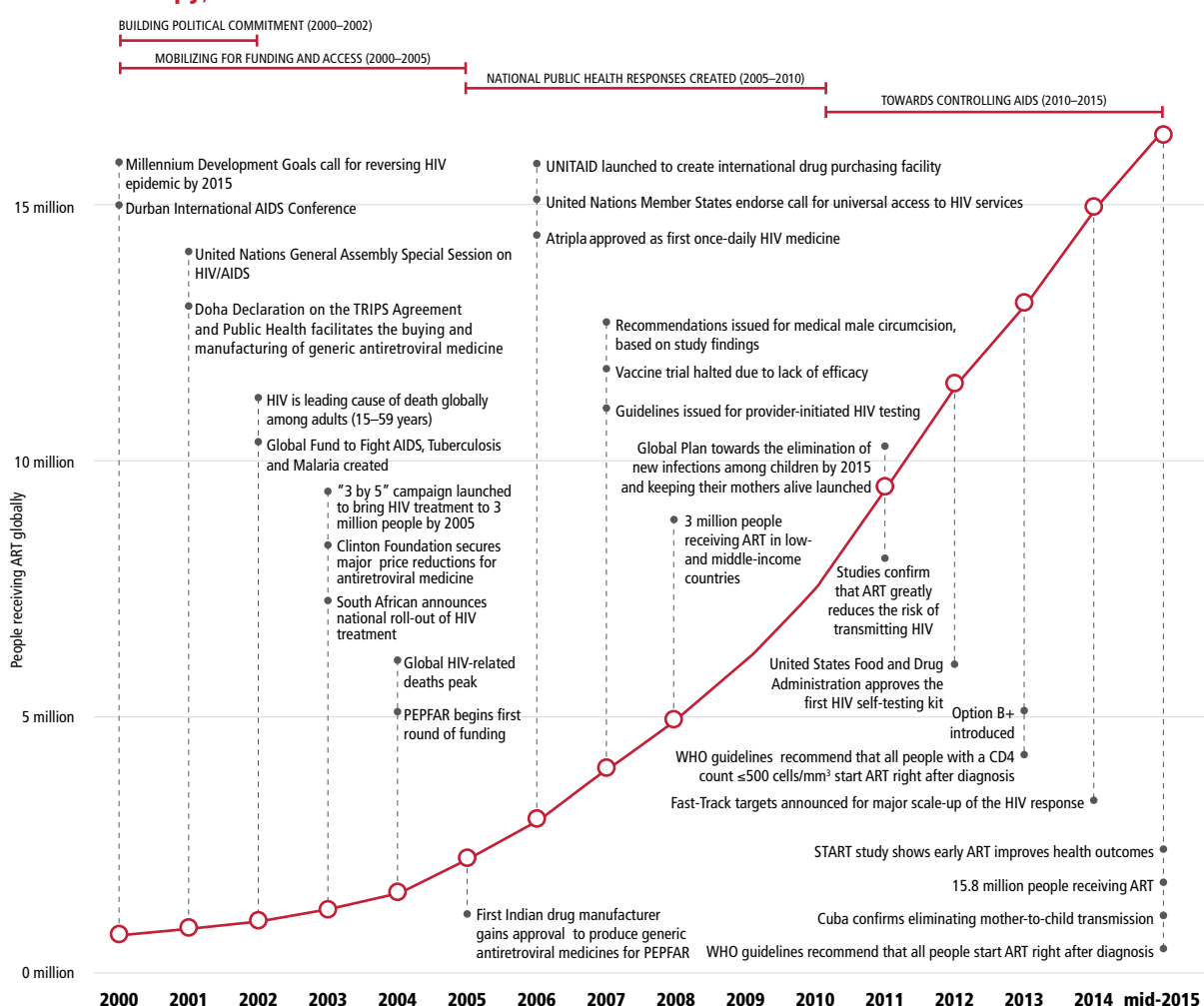
1.2.1 Political commitment and partnerships were focused on targets

Progress has been made by focusing political commitment on achieving global targets and by creating accountability mechanisms for reporting against these targets.

Many national AIDS programmes were operating in 2000. Most, however, lacked sufficient financial backing, and HIV activities were not mobilized behind a common goal and set of targets. That changed quickly as a global HIV movement seized the initiative and pressed for a series of ambitious global commitments, and the research and academic communities built the evidence base.

An early breakthrough was the inclusion of the goal of halting and beginning to reverse the HIV epidemic by 2015 among the Millennium Development Goals in September 2000. A succession of other global targets and commitments followed and became powerful tools for mobilizing and focusing political commitment and action (Fig. 1.8 and Table 1.2). The HIV movement used these targets to leverage and build new partnerships at the global, regional and national levels. Accountability mechanisms, regular reporting of results and integrating targets into funding and national programmes helped to sustain the momentum.

Fig. 1.8 Timeline showing key events versus the number of people receiving antiretroviral therapy, 2000–2015



Box 1.2 Six innovations in Africa which changed the course of their HIV epidemics

Innovations around the world transformed the HIV efforts of countries into a global response capable of achieving Millennium Development Goal 6 and getting HIV treatment to almost 16 million people. The treatment programmes pioneered in Brazil, the prevention successes in Cambodia, India and Thailand and the enterprising efforts to reach key populations with HIV services in China and Ukraine are some of the examples that have inspired and informed programmes around the world.

Nevertheless, the innovations in national programmes have had the greatest impact in the African Region. Faced with the largest HIV epidemics in the world, many countries in the Region overcame formidable constraints to build public health responses to HIV powerful enough to turn the tide against their epidemics. The number of people newly infected with HIV declined by an estimated 41% during 2000–2014, and the extraordinary rollout of HIV treatment averted an estimated 5.4 million deaths. Countries achieved this by assimilating lessons from across the Region and elsewhere and by identifying new ways of overcoming hurdles and scaling up interventions.

1. Taking HIV treatment to scale

Against the odds and despite constrained health systems, the African Region built the world's biggest HIV treatment programmes, using a public health approach that is saving lives and reducing the number of people acquiring HIV infection. The Region now provides treatment to more than 11 million people; in 2000, about 11 000 people were being treated. Countries achieved this by successfully negotiating affordable prices for ARV medicines, by simplifying and decentralizing service delivery systems and making funding go further and by building strong supply chains for ARV medicines and other HIV commodities. New ways of supporting people living with HIV are being introduced to retain more people on lifelong ART. The achievements have not been uniform, however. Treatment coverage is still lower than the global average in some countries with a high burden of HIV infection, and many health systems continue to struggle against serious constraints. There are also concerns about the sustainability of treatment programmes that have relied heavily on earmarked external funding. Nevertheless, the Region on the whole has shown that large, complex treatment programmes can be rolled out, even in the most trying circumstances.

2. Bringing HIV services into communities

Countries have used innovative methods to develop a long-term, chronic care model capable of delivering services at the most appropriate levels of health systems. This model combines the respective strengths of clinics and communities and involves pragmatic divisions of responsibility. Vital services have been decentralized, and cadres of community health workers have been trained to take HIV and other health services deeper into communities, as seen in Ethiopia, Malawi and Zambia, for example. Some countries have gone as far as shifting the delivery of ART and management of people receiving ART to home-based caregivers (11,12). Powered by nurses and other health workers and by networks of people living with HIV, this approach has built a strong basis for tackling HIV and delivering wider health benefits. Many of the innovations were pioneered by such groups as The AIDS Service Organisation in Uganda (13), which integrated prevention and treatment activities at the community level to help to build a coherent public health response (14).

3. Eliminating mother-to-child transmission

The African Region has substantially cut children's risks of acquiring HIV infection. It did this by increasingly linking HIV and antenatal care services so that, in most countries in the region, the vast majority of pregnant women are now tested for HIV and, if HIV-positive, receive ARV medicine to protect their infants from acquiring HIV infection. Malawi pioneered the provision of lifelong HIV treatment to all pregnant women living with HIV, which became the standard recommendation for all countries. Such countries as Botswana, Malawi and Rwanda have pioneered new approaches for diagnosing, testing and jointly treating mothers and children and integrating HIV services with antenatal care.

4. New approaches to prevention and testing

Countries in the African Region have added new prevention methods, notably voluntary medical male circumcision, to strengthen combination prevention. Since 2007, more than 10 million men have been circumcised in 14 designated priority countries. Countries have also led the way with provider-initiated HIV

testing approaches, mass testing campaigns, the use of lay testing counsellors and point-of-care testing and linking HIV testing to other health services – all of which dramatically increased the numbers of people taking HIV tests and HIV diagnoses. These examples have helped to shape new global guidance on HIV testing.

5. Integrated health responses to HIV and TB

The Region has brought together services for preventing and treating HIV and TB in ways that have boosted both sets of interventions, with such countries as Benin, Rwanda and South Africa leading the way. Across the Region, the integration of HIV and TB services has increased the proportion of diagnosed people with TB who know their HIV status to almost 80% (7), with more than three quarters of the people with both HIV and TB initiating ART in 2014. These integrated approaches saved an estimated 1.3 million lives in sub-Saharan Africa between 2005 and 2014 (7).

6. Funding for sustainability

The Region has supplemented external funding for its HIV programmes with domestic funds – to the point where large and growing portions of some of the largest programmes in the Region are now funded domestically. Countries are also using enterprising new ways of generating additional funds. Zimbabwe increased domestic funding by adding an AIDS levy to the income system, and Rwanda has pioneered integrating HIV services into its national social insurance scheme. The latter system, which currently covers almost 90% of the country's population, includes treatment services free of user charges for HIV, TB and malnutrition and has increased the uptake of health services generally.



Table 1.2 Progress made against key global HIV targets

HIV target	Epidemic status when target was set	Global progress	Progress in the WHO African Region
Millennium Development Goal 6: Halt or reverse the HIV epidemic by 2015	Estimated 3.1 million people acquired HIV infection globally in 2000 2.3 million people acquired HIV infection in the African Region in 2000	Estimated 2.0 million people acquired HIV infection in 2014 Declining HIV incidence in 82 countries compared with 2000	Estimated 1.4 million people acquired HIV infection in 2014 Declining HIV incidence in 38 countries
3 million people living with HIV receiving ART by 2005	Estimated 970 000 people receiving ART globally in 2002 Estimated 52 000 people receiving ART in the African Region in 2002	Estimated 2.2 million people receiving ART in 2005	Estimated 730 000 people receiving ART in 2005
3 million people living with HIV receiving ART by 2005 Reduce by 90% the number of children newly infected with HIV by 2015 (Global Plan for eliminating mother-to-child transmission and keeping their mothers alive)	Estimated 400 000 children acquired HIV infection in 2009	Estimated 220 000 children acquired HIV infection in 2014 (45% reduction compared with 2009)	Estimated 190 000 children acquired HIV infection in 2014
15 million receiving HIV treatment by 2015	Estimated 9.4 million people receiving ART in 2011 globally Estimated 6.1 million people receiving ART in the African Region in 2011	Estimated 15.8 million people receiving ART in mid-2015	Estimated 11.4 million people receiving ART in mid-2015

1.2.2 A public health approach was put into practice

An innovative and integrated public health package of HIV services was developed and improved based on emerging evidence.

Regularly updated, evidence-informed recommendations guided the selection of HIV services by countries while technical and other types of assistance supported implementation.

Translating targets into operational packages of interventions has been crucial while guidance on treatment, prevention and care services has been regularly updated and simplified and country support has been provided for implementation. This has laid the basis for the global public health approach that has been rolled out in three phases.

In 2002, WHO issued the first guidelines for aligning HIV treatment with the public health approach by providing a standard package of treatment and care (15). This was backed by country support, while social justice networks and various partners sought to reduce the prices of ARV medicines and to expand access to the standard package.

The “3 by 5” initiative, which targeted reaching 3 million people with ART by 2005, added major impetus to the public health approach and helped to mobilize greater commitment and resources. A scale-up period followed during which the treatment and care package was progressively simplified

and standardized and quality assurance was strengthened. For example, diagnostics and recommended treatment dosages were standardized and the number of pills required for treatment was reduced. Whereas HIV treatment in 2000 could entail taking up to 28 pills a day at various intervals, in 2015 the standard regimen for most people starting treatment is a single pill taken once a day.

The public health package enabled new approaches and guidance for prevention, voluntary medical male circumcision, HIV testing, strengthening retention in care and treatment adherence to be integrated at all levels. This has enabled the development and rolling out of a global public health package of services that is simplified and that can be adapted rapidly to reflect new scientific evidence and implementation experiences.

Regularly updated WHO guidance has been crucial for this process, with many of the recommendations adopted rapidly in countries. In 2013, WHO consolidated its guidance on HIV treatment and integrated it further into a public health package with testing and prevention, focusing on increased access and impact. Updated guidance, published by WHO in 2015 (16), recommends initiating early ART for all people with HIV (see Chapter 2). This approach recognizes the major benefits of early HIV treatment for both HIV prevention and viral suppression at the individual and population levels.

1.2.3 Civil society extended the HIV response into communities

Global pressure for universal treatment access drove the prices of ARV medicines down and enabled treatment to be scaled up.

Community groups have supported the expansion of HIV services into remote and marginalized communities in all global regions.

Powered by the activism of people directly affected by the epidemic, the HIV movement grew from its origins in urban communities in the Americas, western Europe and Australia and largely women-led community groups in Africa to become a global health movement. The principle of greater involvement of people living with HIV became a beacon for the response, strengthened political governance and deepened the implementation of HIV programmes.

The movement made several key breakthroughs. It elevated the epidemic high on the public health agenda and positioned it as a priority for social justice and human rights. It emphasized the links between the epidemic and development in low- and middle-income countries. It led by example, pioneering models of community-based prevention and care, including for marginalized and key populations, and pushed for policy changes and institutional support for these initiatives. It globalized demands for access to affordable treatment, bringing together activists and advocates from all regions and focusing their energies especially on expanding treatment access in the African Region. It democratized and supported the implementation of HIV services.

The movement challenged the pricing of pharmaceutical products and generated the political support for the demand for universal access that would power the global scaling up of HIV treatment (17,18). Affordable treatment became a reality in a growing number of low- and middle-income countries – a victory that foreshadowed the emerging consensus around the goal of universal health coverage.

The rights and social justice discourse that shaped the HIV response also led to a more intense focus on challenging the stigma and discrimination that influenced public reactions to the epidemic and on ensuring that marginalized populations benefit equitably from HIV programmes.

Community groups also helped to shore up and democratize HIV services. Organized into teams of treatment supporters, community health workers and outreach workers, they have extended the health sector response to HIV deeper into communities that had been sidelined by public health services. Civil society and communities became major implementing partners within programmes.

Millions of people have benefited, from remote rural villages in Africa to men who have sex with men in China and Thailand, sex workers in the Dominican Republic and India and people who inject drugs in Spain and Switzerland. Arguably, no other global health movement has been as popularly grounded and politically effective as the response to HIV.

1.2.4 Funding was mobilized and costs were reduced

Donor assistance was mobilized to help reach the agreed targets, including through unique new funding mechanisms, while domestic funding increased substantially.

Sustained pressure forced price reductions for ARV medicines that enabled treatment programmes to be implemented around the world.

International funding assistance for HIV programmes had been limited up to 2000, with estimates published in 2001 showing a massive shortfall in the funding available to confront the epidemic (19). As concerns grew that the epidemic was spinning out of control, funding for HIV programmes began to increase sharply.

The World Bank initially committed US\$ 500 million for the Multi-Country HIV/AIDS Program for Africa and sustained high levels of funding support. Major funding was added with the creation in 2002 of the Global Fund to Fight AIDS, Tuberculosis and Malaria, a unique multilateral funding mechanism for public health, and the United States President's Plan for Emergency AIDS

Relief (PEPFAR), a bilateral aid programme, in 2003. The Global Fund quickly became one of the largest sources of funding for HIV, TB and malaria programmes in low- and middle-income countries, investing approximately US\$ 4 billion per year to support national and community programmes. Since 2003, PEPFAR has funded almost US\$ 52 billion of HIV programmes through bilateral channels as well as contributing via the Global Fund (20). Bilateral funding also increased, and funding and other support from entities such as the Bill & Melinda Gates Foundation and the Clinton Health Access Initiative made important contributions.

Total HIV funding in low- and middle-income countries increased sharply before levelling during 2008–2010 and then rising again. Between 2000 and 2014, more than US\$ 187 billion was allocated to HIV programmes in low- and middle-income countries (21). A new governance approach for health emerged, with governments, civil society organizations, multilateral agencies, philanthropic bodies and public–private partnerships often deciding jointly how and where to deploy HIV funding.

Domestic funding became an increasingly significant source of money for HIV programmes in low- and middle-income countries: after 2005 it almost doubled to about US\$ 10 billion in 2012. By 2014, domestic funding comprised about 57% of total resources available for HIV programmes in low- and middle-income countries. Between 2009 and 2014, 84 of 121 low- and middle-income countries increased their domestic spending on AIDS. Among these, 46 countries reported an increase of more than 50%, including 35 countries that reported an increase of greater than 100% (21). This shift is important for strengthening the ownership and sustainability of countries' HIV responses.

Other innovative funding methods were introduced. A levy on airline tickets provides a large share of the funding for the international purchasing facility UNITAID, which has been instrumental in increasing the provision of ART for children, second-line ARV medicines, integrated prevention of mother-to-child transmission and point-of-care and decentralized HIV diagnostics. Some countries are using dedicated tax levies and fees imposed on mobile phone use (22) and HIV trust funds (23) to supplement HIV funding.

The price reductions achieved for ARV medicines rendered large-scale treatment programmes feasible (Box 1.2). Pressure from a global movement for treatment access, backed by key legal decisions, led to the relaxation of some intellectual property restrictions affecting first-line ARV medicines, which enabled the manufacturing and marketing of more affordable generic versions. Arrangements brokered on many fronts helped lower the costs of HIV treatment and strengthen systems for ART delivery. As ART programmes expanded, the growing economies of scale lowered the prices further (see Chapter 3). Countries achieved further savings by adjusting tender specifications, reducing transport and logistical expenses and lowering tariffs and duties.

The global HIV response also led the way in protecting people against the financial risks associated with seeking health care. Many HIV services are now provided free of charge, and countries increasingly use supportive arrangements to minimize the indirect costs for the people receiving services. Rwanda and Thailand are among the countries that have integrated HIV services into their basic health service and/or social insurance packages (24).

1.2.5 Innovations in science and implementation were widely used

Research-driven breakthroughs in basic and clinical science and implementation research provided the tools for reversing the HIV epidemic.

Specialized clinical service models were adapted into more flexible, community-based approaches, and ways of providing HIV services have taken them into remote and marginalized communities.

Since the first report of a drug showing efficacy against HIV emerged in 1986, more than 35 drugs and formulations have been approved for use (25), and more than a dozen compounds are in the pipeline, including long-acting drug formulations (26). ARV medicines have been successfully deployed for treatment, PMTCT, post-exposure prophylaxis (PEP) and pre-exposure prophylaxis (PrEP). In the field of diagnostics, research has led to the development of self-testing kits and point-of-care diagnostics for key laboratory measures, including CD4 count and viral load. Other biomedical innovations have included the demonstrated efficacy of medical male circumcision, supported by the development of safe, simple circumcision devices, and the ongoing pursuit of an HIV vaccine.

As the potential grew for boosting HIV treatment coverage, service delivery models had to be adapted. This entailed shifting the provision of HIV treatment from a specialized clinical model to one that is more flexible and reaches further into communities. National programmes drew on some of the community-based models used in disease prevention programmes in the 1990s.

The specialized clinical model of service delivery evolved into a more integrated public health approach that is more flexible and reaches further into communities. This greatly extended access to services in places with a high burden of HIV infection, especially for HIV testing and treatment (27). Diagnostic and treatment regimens were simplified and standardized and were connected more firmly with testing and outreach services. HIV services were integrated at first with antenatal care and then with TB and other services. By linking clinical and community interventions, treatment was scaled up following a public health model of delivery, most obviously in countries with high burden of HIV infection in the African Region.

Human resource models were adapted to use nurses and community health workers in more flexible and mutually supportive roles. It became possible to provide services at the most appropriate levels of health systems, with an emphasis on bringing these services closer to communities.

In some countries, community groups and nongovernmental organizations (NGOs) have been the only groups capable of effectively reaching marginalized key populations with HIV prevention and treatment services. In eastern Europe and central Asia, for example, NGOs and community-based groups are centrally involved in providing harm reduction and other outreach services for key populations, community-based rapid HIV testing and linkages to HIV care. Community-based approaches have also helped reduced stigma and discrimination.

These service delivery adaptations are providing a basis for tackling communicable and chronic conditions

in resource-poor settings, an important aspect of the sustainable development agenda.

1.2.6 Data improved and increasingly drove decisions

Improved HIV data and analysis strengthened knowledge of country epidemics and enabled services to be tracked, adjusted and expanded accordingly.

A global accountability framework was built and adapted to serve results-based national programmes.

Several successful HIV prevention programmes in the 1990s (in Thailand and Uganda, for example) had used data at the local level to support community-based responses, but this was not yet a common approach. This changed after 2000, as the global HIV response used HIV data more coherently, a process that occurred in three phases.

- Global HIV targets were set to guide HIV responses and serve as a basis for regular reporting and accountability.
- The targets were built into the implementation models of funding agencies and national programmes, which enabled them to focus on common results. Data were used to measure and manage programme implementation.
- Programmes increasingly generated disaggregated and real-time data to guide activities and programme decisions at the local and community levels.

Progress against the targets was regularly and widely reported, with the analysis of achievements and areas for improvement feeding into an ongoing learning process. This built accountability into the HIV response. The targets were

incorporated into national strategies, where they informed national budgets and programmes. Governments and other partners shared their HIV data biannually in a standardized manner, enabling comparable data to be reported. By 2015, 180 countries were reporting their HIV programme results in a regular and consistent manner. These kinds of accountability mechanisms are relatively unique in the development sector and comprise a cornerstone for the global HIV response.

HIV data collection grew more sophisticated and comprehensive, especially in the African Region, where household-based surveys with HIV elements became important for guiding programming decisions. An emerging development is the collection of disaggregated and granular data to focus HIV interventions for greater impact at the local and community levels. There has been significant investment in Demographic and Health Surveys (increasingly featuring periodic biological markers), electronic district health information systems, key population mapping techniques, along with regular programme and impact reviews convened by WHO.

The collection and use of reliable HIV data has also been vital for managing the procurement and supply chains that underpin the scaling up of HIV treatment. Improved forecasting of ARV medicines and other HIV commodity needs and information-sharing between the different levels of the supply chain have been crucial for minimizing stock-outs of testing kits and ARV medicines, for example, and for increasing programme efficiency (28).

1.3 A platform for ending the AIDS epidemic

A powerful global public health response has been built, with large declines in the numbers of people newly infected with HIV and dying from HIV-related causes. The response has proved that life-saving services can be delivered effectively, equitably and at massive scale in very difficult circumstances. These accomplishments have made it possible to pivot the global HIV response towards ending AIDS as a serious public health threat.

The global response is at a critical juncture. Even gradually expanding the current coverage of key services will not be enough to end AIDS. Epidemics would resurge, the number of people newly infected with HIV would increase again and the numbers of people requiring HIV treatment and care

would keep growing for generations hence. The costs of prevention, care and treatment would continue to grow for the long term.

The global HIV response has to shift into even higher gear.

Ending the AIDS epidemic by 2030 is the challenge set in the Sustainable Development Goals, which feature the role of health in averting poverty and facilitating development as a major goal. The health goal (Sustainable Development Goal 3) addresses a range of health challenges, notably in Target 3.3, which highlights the need to end the AIDS epidemic. Progress in that quest will contribute to reaching a range of other key health targets.

1.3.1 A set of decisive targets lies ahead ...

The goal of ending AIDS has been crystallized into a set of milestones for 2020 and targets for 2030 (29). Grounded in the principle of universal health coverage, these targets are aimed at reducing the numbers of people newly infected with HIV and dying from HIV-related causes decisively enough to position and then keep the HIV response on course for ending the AIDS epidemic. These targets apply to everyone: children, adolescents and adults; rich and poor; women and men; and all key populations.

HIV-related deaths

- Reduce the global number of people dying from HIV-related causes to less than 500 000 by 2020.
- Reduce the number of people living with HIV dying from TB-related causes by 75% (compared with 2010).
- Reduce the number of people living with HIV dying from hepatitis B- and C-related causes by 65% in accordance with the mortality targets for all people with chronic hepatitis B and C infection (compared with 2010).

Testing and treatment

- 90% of the people living with HIV know their HIV status by 2020, and 95% by 2030.
- 90% of the people diagnosed with HIV are offered ART

by 2020, and 95% by 2030.

- 90% of the people living with HIV receiving treatment achieve viral suppression by 2020, and 95% by 2030.

Prevention

- 75% reduction (compared with 2010) in the annual number of people newly infected with HIV, including among key populations, to fewer than 500 000 by 2020, and a 90% reduction by 2030, to fewer than 200 000.
- Zero children newly infected with HIV.
- A proposed 90% reduction in hepatitis B and C incidence by 2030

Discrimination

- Zero HIV-related discriminatory laws, regulations and policies and zero HIV-related discrimination in all setting, especially health settings.
- 90% of people living with HIV and key populations report no discrimination in the health sector.

These are demanding targets. Reaching them will require overcoming major challenges. "More of the same" will not be enough.

1.3.2 ... But a big divide remains

Despite decreasing impressively, the total numbers of people newly infected with HIV and dying from HIV-related causes currently far outstrip the targets. The number of people newly infected needs to be cut by three quarters and the number of people dying needs to decrease by more than half by 2020 to build sufficient momentum to end AIDS by 2030.

The gaps are even greater in some countries and regions in which the achievements in the past 15 years have been modest and wavering. Various disparities also mean that the benefits of HIV interventions are not spread equitably across countries and populations.

More must be done and more rapidly. The current coverage of services is inadequate and is improving too slowly to achieve the targets. Globally, almost half (46%) of the estimated 36.9 million [34.3 – 41.4 million] people living with HIV at the end of 2014 did not know their HIV status, and almost 60% were not accessing ART. The full potential of HIV prevention is not being realized: the estimated 2.0 million [1.9 – 2.2 million] people newly infected with HIV in 2014 were four times as many as the target for 2020.

Greater equity is needed. The progress to date has been distributed unevenly and inequitably. The HIV incidence is declining overall but is increasing in some

countries and regions. Many of the populations at higher risk for acquiring HIV infection are not being reached sufficiently and quickly enough with HIV services. Human rights violations, along with widespread stigma and discrimination and gender inequality, still hinder access to health services.

Interventions must be focused better. The impact of HIV programmes will increase if interventions focus on the populations and locations with the most HIV transmission and the greatest need for services.

Quality must be ensured. The quality of services and commodities must be safeguarded to avoid compromising the effectiveness of HIV programmes, wasting precious resources and undermining public health outcomes. Quality should not be sacrificed for the sake of more rapid expansion.

Coinfections and other comorbidities have to be tackled. The morbidity and mortality associated with coinfections such as TB, hepatitis B and hepatitis C and other comorbidities are undermining the investment in and impact of the treatment scale-up. Despite improvements, TB remains the leading cause of HIV-related deaths.

Overcoming the hindrances requires not only will and effort. Systems require strengthening or

adjustment, greater resources are needed, interventions can be combined and targeted more precisely, waste can be

reduced and quality must be assured. All this is feasible – as the past 15 years have shown.

1.3.3 Action for closing the gaps

Closing the gaps will require improvements and innovations along the entire cascade of HIV services for prevention, treatment and care – as discussed in Chapter 2. It will require focusing and linking evidence-based interventions for maximum impact while ensuring their quality and enhancing them with constant innovation.

Cutting the incidence of HIV infection by 75% demands wider and more effective use of combination prevention and bolstering it with new tools and approaches. For example, the full potential of consistent condom use and other behaviour change still needs to be tapped. Alongside these tools, the use of ARV medicines, including ART, as part of combination HIV prevention has game-changing potential. The full preventive power of voluntary medical male circumcision has yet to be harnessed. The development and use of an effective vaccine, even one with partial efficacy, would push the response even closer towards ending the AIDS epidemic.

Drastically reducing the number of people losing their lives to HIV requires successfully shifting to a treat-all approach, as recommended in the latest guidelines issued by WHO (16). This requires diagnosing many more people living with HIV much sooner after they acquire it and successfully linking them to treatment and care services immediately. New HIV testing approaches, including self- and community-based testing, and new quality-assured testing technologies hold great promise for reaching more people living with HIV and enrolling them in treatment.

The people receiving treatment need to be retained in care more successfully and to maintain viral suppression in the long term. This will require unprecedented effort and innovation from countries and partners, with specific attention to overcoming the inequities that remain and

assuring the quality of medicines and services. Strategies to strengthen treatment adherence and retention in care will be essential along with strategies that link HIV services with those for TB, viral hepatitis and other major health conditions.

There are enormous opportunities for capitalizing on the progress made over the past 15 years. WHO's proposed Global Health Sector Strategy on HIV 2016–2021 (30) will describe the priority actions for enhancing the impact, equity and efficiency of HIV services along the prevention, diagnosis, treatment and care continuum (see Chapter 3).

In addition, WHO will continue to issue new and updated technical guidelines to help steer this momentous shift towards ending the AIDS epidemic. The latest guidelines detail the opportunities and improvements that are needed in four crucial areas:

- **Testing:** expanding the coverage and quality of HIV testing and strengthening links to care (31);
- **Treatment:** achieving treatment for all (16);
- **Key populations:** reaching key populations with HIV services (32); and
- **Strategic Information:** tracking progress along the entire cascade of HIV services and ensuring accountability for reaching the Fast-Track targets (33).

The priority actions and approaches outlined in the proposed WHO Global Health Sector Strategy on HIV 2016–2021 (30), in WHO's technical guidance and in the next two chapters of this publication will be crucial for meeting the major challenges that lie ahead.





CHAPTER 2

THE HIV PREVENTION AND TREATMENT CASCADE: progress, gaps and priorities

This chapter focuses on the progress and action related to systematically implementing interventions and closing the gaps along the cascade of HIV services. For each stage of the service cascade, the chapter presents country examples to highlight innovations that have brought success, along with the challenges ahead and the action that can address them. In accordance with the report's

focus on how countries in the WHO African Region have transformed their HIV responses to curb their epidemics, many of these examples are drawn from the African Region. The chapter addresses cross-cutting issues such as service delivery models, health system strengthening and health equity, though these are discussed in greater detail in Chapter 3.

In this chapter

2.1 PREVENTING PEOPLE FROM BECOMING NEWLY INFECTED WITH HIV

- 2.1.1 Reducing new HIV infections by changing sexual behaviour and using condoms
- 2.1.2 Expanding voluntary medical male circumcision
- 2.1.3 Eliminating the mother-to-child transmission of HIV
- 2.1.4 Reaching key populations with HIV prevention services
- 2.1.5 Using ARV medicines for prevention

2.2 HIV TESTING AND LINKAGE TO CARE

- 2.2.1 Diagnosing people living with HIV
- 2.2.2 Linking people to HIV treatment and prevention

2.3 TOWARDS TREATMENT FOR ALL

- 2.3.1 Closing the gaps in treatment coverage
- 2.3.2 Starting HIV treatment earlier
- 2.3.3 Achieving viral suppression
- 2.3.4 Closing the gaps in treating children and adolescents
- 2.3.5 Tackling comorbidities

Achieving the HIV targets requires that countries rapidly increase coverage of high-impact, evidence-based interventions along the entire cascade of services for preventing, diagnosing and treating HIV and focus especially on reducing the number of people newly infected with HIV by

75% (compared with 2010). They will need to do this while emphasizing reaching the populations and geographical locations with the greatest need and without compromising quality.

2.1 Preventing people from becoming newly infected with HIV

The HIV service cascade starts with averting risk and preventing people from acquired HIV infection, although opportunities for such interventions exist all along the cascade. Prevention services have been the major factor in the decline in the number of people newly infected with HIV during the past 15 years, especially in the WHO African Region. However, additional major improvements are needed to reduce the number of people newly infected with HIV by 75% in the next five years.

The decline in the number of people newly infected with HIV has mainly resulted from combinations of established prevention tools, especially greater use of male condoms and (to a lesser extent) female condoms, behaviour change programmes, the scaling up of ART and HIV prevention packages for populations with high incidence of HIV, especially key populations.¹ The natural evolution of the epidemic has been an important contributing factor.

In more recent years, powerful new tools have added great potential to achieve greater reductions in the number of

people newly infected with HIV if used in combination with prevention tools that are already established and effective. Uptake of voluntary medical male circumcision has increased rapidly, while other interventions, notably pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP), have great potential but are insufficiently used at present. While it is vital to continue the search for a vaccine and for an effective microbicide that can prevent acquisition of HIV, such innovations would still need to be used in combination with existing prevention tools.

Wider coverage of service packages that strategically combine these prevention tools could bring the target of a 75% reduction in new HIV infections by 2020 within reach. For this to happen, interventions need to be selected for maximum effectiveness, and they should be focused where the HIV burden is greatest. Interventions with no or limited effectiveness need to be dropped. Prevention needs to be integrated at all stages of the continuum of HIV services: testing, diagnosis, treatment and adherence support.

¹ Key populations are considered to be at very high risk of HIV infection and typically include men who have sex with men, transgender women, sex workers and their clients and people who inject drugs. Prisoners, migrant workers, certain transport workers and military personnel are often also at high risk for HIV infection.

2.1.1 Reducing new infections with sexual behaviour change and condom use

Changes in sexual behaviour are making a difference, but sustaining them and ensuring that HIV prevention services are provided along the entire cascade of services is a challenge.

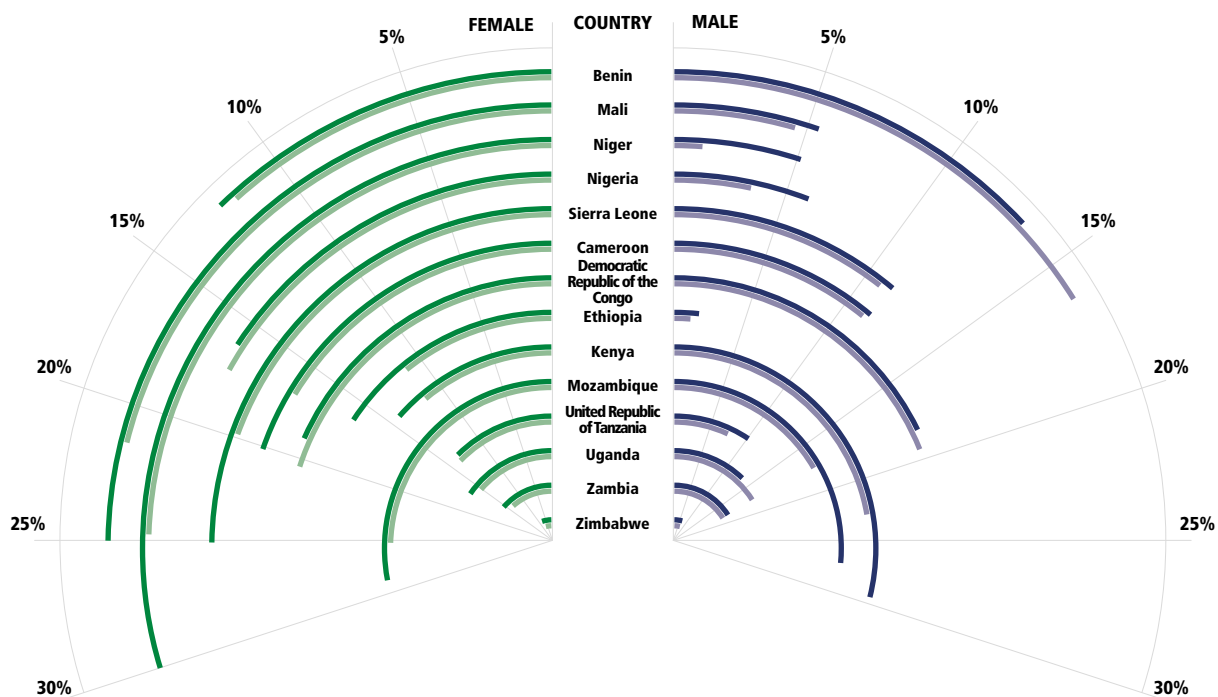
Condom use has increased but is not consistent enough to realize its full benefits, partly because condoms are still not sufficiently available in many countries.

Sexual behaviour changes, including increased condom use and reductions in high-risk sex, have been important factors in the declines in the number of people newly infected with HIV in the past 15 years, especially in the African Region. Household survey data indicate an overall trend toward

reduced risk of sexual HIV transmission in that region, with studies attributing reduced HIV incidence to changing sexual behaviour, including increased condom use, in several countries, including Kenya, Malawi, South Africa, Zambia and Zimbabwe (1–6).

The behaviour changes have included fewer multiple sexual partnerships and delayed sexual debut. As Fig. 2.1 shows, decreasing proportions of young men and/or women have become sexually active before turning 15 years old in several countries with a high burden of HIV infection, including Cameroon, Ethiopia, Kenya, Mozambique and Zimbabwe. However, those trends were not consistent across countries or between men and women.

Fig. 2.1 Percentages of young men and women (15–24 years) who reported having had sex before age 15 years, selected countries in the African Region, 2005–2014



Source: DHS STATcompiler [online database] (7).

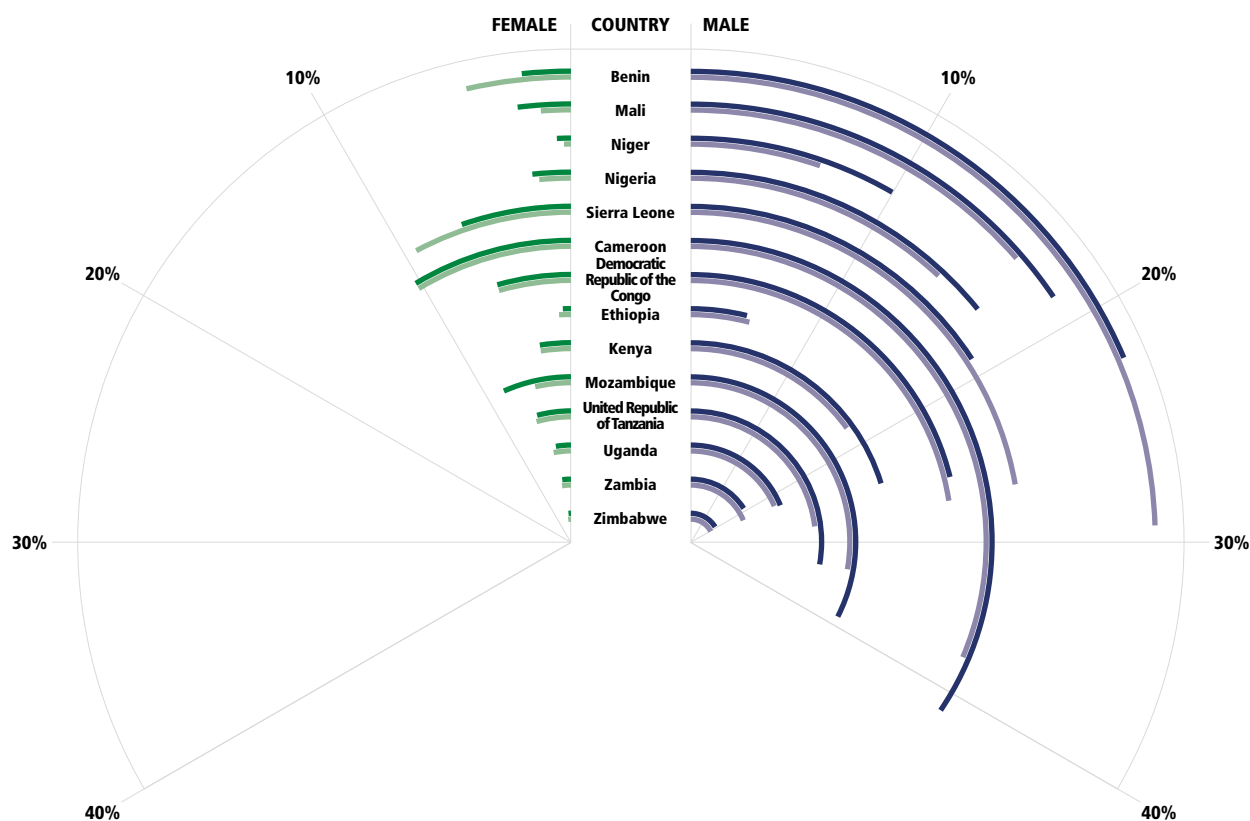
Note: The data shown are for countries with comparable data sets for different years. The lighter shaded bar denotes the most recent survey.

There is similar unevenness in the proportions of young men and women (Fig. 2.2) who reported having more than one sexual partner in the previous year. These trends currently are a cause for concern.

During 2000–2014, the percentage of men 15–49 years old reporting multiple sexual partners in the past 12 months increased slightly in 31 countries reporting

comparable survey data, with notable increases in several countries in western and central Africa as well as in Ethiopia, South Africa, the United Republic of Tanzania and Zimbabwe (8). There are also indications that earlier positive changes have reversed elsewhere in the world, including in several high-income countries – a reminder that changing behaviour is an ongoing challenge (9–11).

Fig. 2.2 Percentages of young men and women (15–24 years) who reported having multiple sexual partners in the previous 12 months, selected countries in the African Region, 2005–2014



Source: DHS STATcompiler [online database] (7).

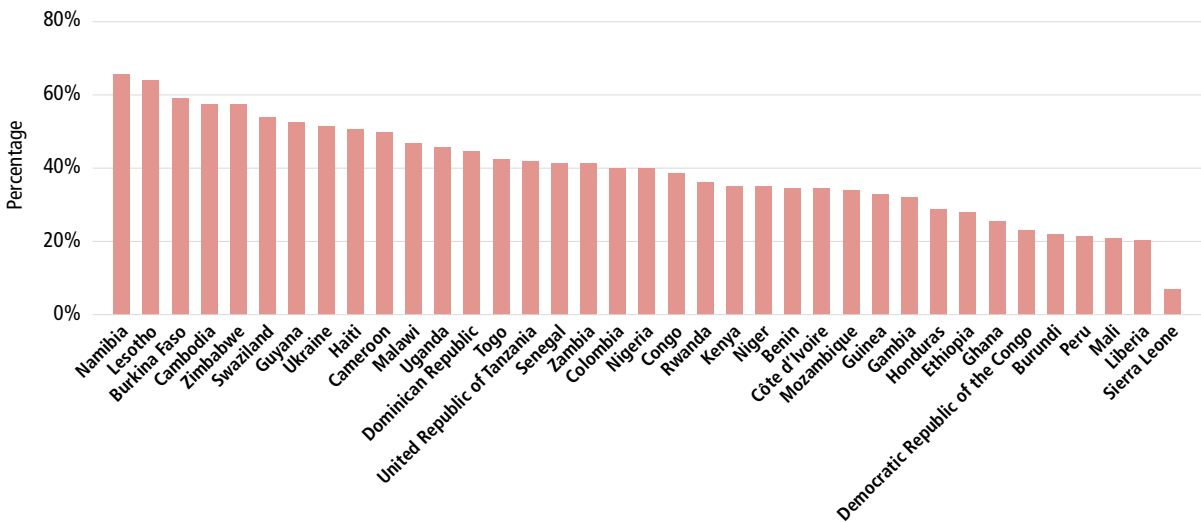
Note: The data shown are for countries with comparable data sets for different years. The lighter shaded bar denotes the most recent survey.

Encouragingly, reported condom use among people 15–49 years old has increased in several countries, especially among women. In the past decade, growing proportions of sexually active young people in the African Region have reported using condoms at last sex.

Generally, reported condom use tends to be higher among men than women (Fig. 2.3 and 2.4), and it is highest among certain key populations, such as female sex workers (75–80%) and men who have sex with men (about 60%). Condom use is considerably lower among people who inject drugs (less than 40%). Overall, consistent condom use tends to be more likely with non-regular partners than in ongoing relations.

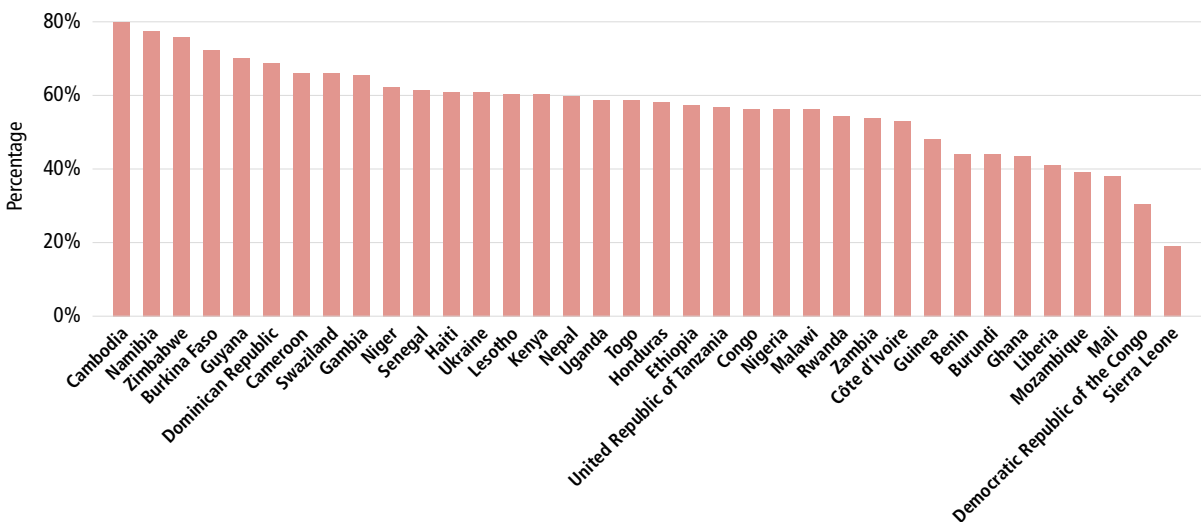
Although on the increase, the full benefits of this established intervention are not being realized, including among populations that face the highest risk of HIV infection. Reported condom use at last sex with non-regular partners ranges from 80% in Cambodia and Namibia (for men) to less than 40% in other countries (men and women), including some that are highly affected by HIV (Fig. 2.3 and 2.4). More than 80% of people 15–24 years old in some Latin American and European countries reported using a condom at last sex, compared with less than 30% of their peers in some countries in western Africa (8). More countries need to strengthen access and increase the consistent use of condoms, especially for young people and key populations and between non-regular partners.

Fig. 2.3 Reported condom use among women (15–49 years) at last sex with a non-regular partner, 2010–2014



Source: DHS STATcompiler [online database] (7).

Fig. 2.4 Reported condom use among men (15–49 years) at last sex with a non-regular partner, 2010–2014



Source: DHS STATcompiler [online database] (7).

Insufficient availability of male and female condoms is a major drawback, including among key populations and young people. In the African Region in 2013, as few as 10 condoms per man per year were available, and there was only one female condom available for every eight women (12). Nevertheless, some countries in the Region, including Botswana, Namibia, South Africa and Zimbabwe, have been distributing more than three times the regional average, showing that greater availability can be achieved (13).

How we can close the existing gaps

Negative preconceptions about condoms, especially among men, persist and should be addressed. Informed sex

education is a vital – although widely neglected – aspect of HIV and sexually transmitted infection prevention generally and of condom promotion specifically (Box 2.1). In addition, programmes that address sexual behaviour are vital for HIV prevention and need to be sustained as new approaches to combination prevention are introduced. Countries and donors need to give priority, with adequate investment, to providing and promoting male and female condoms and lubricants. This includes greater diversification of condom marketing and integration of condom distribution in various existing services, including those for HIV, sexually transmitted infections, harm reduction, family planning and key populations. An appropriate mix of private and public distribution is also needed. In the African Region, for

example, less than 10% of condoms are distributed through the private sector, whereas in some other regions, private sales account for more than 90% of condom distribution.

Action and innovation to speed up progress

- Reinforce the need for combination prevention approaches, including new approaches as they become available, along with well established interventions for providing condoms and changing sexual behaviour.
- Revitalize male and female condom programming, including through new public–private partnerships for greater commercial investment in condom markets, especially in the African Region, and invest in developing new condom materials, designs and promotional methods that make condoms more acceptable and easier to use.
- Tackle stigma, including in the health sector, and overcome legal barriers for providing prevention and treatment services, especially for key populations.

Box 2.1 The burden of sexually transmitted infections is still high, especially among key populations

Preventing and controlling sexually transmitted infections helps reduce new HIV infections and is an important component of a comprehensive HIV prevention strategy, especially among key populations with many sexual partners.

The global burden of curable sexually transmitted infections remains high, with more than 130 million people infected with *Chlamydia trachomatis*, 85 million with *Neisseria gonorrhoeae* and about 6 million with syphilis. Viral sexually transmitted infections account for an additional 417 million prevalent cases of herpes simplex virus infection, and about 291 million women are infected with human papillomavirus (14).

Among key populations, the burden of sexually transmitted infections is especially high. In countries reporting these data in Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) in 2015, at least 5% of female sex workers and men who have sex with men tested positive for syphilis. Legal and social barriers, including stigma and discrimination, continue to block access to high-quality sexually transmitted infection services, thus preventing early diagnosis and treatment. The problem is especially acute for men and transgender women who have sex with men, especially in countries where sex between men is criminalized.

Emerging gonococcal antimicrobial resistance is a growing threat. The latest available data, for 2012, showed 42 countries reporting decreased susceptibility and 10 countries reporting resistance to extended-spectrum cephalosporin, the last-line treatment for gonorrhoea.

2.1.2 Expanding voluntary medical male circumcision

Uptake of voluntary medical male circumcision has increased rapidly, with more than 10 million procedures performed by September 2015, more than 3 million of them in 2014 alone.

Some countries have already reached the 80% coverage target, and there are opportunities for more rapidly scaling up this intervention.

Integrating new prevention services into combination prevention is critically important to more rapidly reduce the numbers of people newly infected with HIV. After

years of observational data, randomized clinical trials in Kenya, South Africa and Uganda in the mid-2000s confirmed that voluntary medical male circumcision reduced the risk of female-to-male sexual transmission of HIV by about 60% (15–17). This evidence led WHO and UNAIDS to recommend in 2007 that 14 priority countries in eastern and southern Africa add the intervention to their HIV prevention strategies (18).² The basic voluntary medical male circumcision service package combines the intervention with condom promotion, safer sex education, HIV testing and management of sexually transmitted infections.

² The 14 priority countries in Africa are: Botswana, Ethiopia (Gambella Province), Kenya, Lesotho, Malawi, Mozambique, Namibia, Rwanda, Swaziland, South Africa, Uganda, United Republic of Tanzania, Zambia and Zimbabwe.

Modelling has shown that reaching and then sustaining 80% coverage of male circumcision among adolescent and adult males in the priority countries could prevent about 3.4 million people from becoming newly infected with HIV from 2010 to 2025, with cost savings of US\$ 16.5 billion (19). Additional benefits of voluntary medical male circumcision include reductions in the incidence of herpes simplex virus-2 and human papillomavirus (20).

Uptake of the intervention has expanded impressively, especially in the past three years. By late 2015, more than 10 million voluntary medical male circumcisions had been performed in the priority countries. Once policies, programmes and services were in place, uptake soared, with more than one third (3.2 million) of the circumcisions performed in 2014 alone (Fig. 2.5).

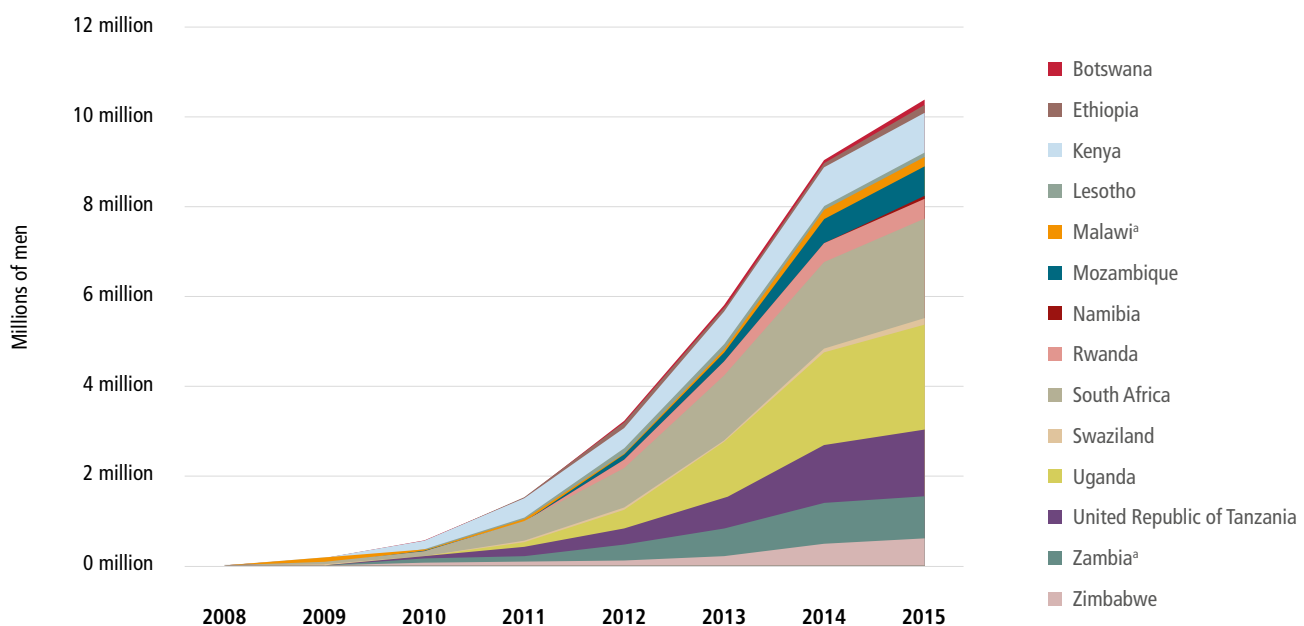
Box 2.2 How Kenya and the United Republic of Tanzania stepped up their male circumcision programmes

The voluntary medical male circumcision programmes in Kenya and the United Republic of Tanzania are expanding rapidly. The programme in Kenya surpassed its coverage target by the end of 2014. Solid political support, a coherent strategic framework, competent programme management structures and strong buy-in at all levels laid the groundwork for this achievement. Service delivery strategies have focused on specific age groups, with some targeting older men at high risk of HIV infection, while rapid results initiatives have focused on adolescents during school holidays. County governments are being encouraged to integrate voluntary medical male circumcision in their health plans, allocate resources accordingly and provide the service as part of the essential health package.

Meanwhile, after a slow start during 2008–2011, the voluntary medical male circumcision programme in the United Republic of Tanzania expanded quickly, thanks to strong advocacy and improvements in community mobilization and service delivery. The programme was recently fully institutionalized and now includes offers of voluntary medical male circumcision as part of routine health care service in public, private and faith-based health care facilities. The move has had a rapid effect: the number of circumcisions performed in 2014 alone almost matched the total achieved between 2008 and 2013.

Both Kenya and the United Republic of Tanzania now intend to give priority to voluntary medical male circumcision for adolescent males. In both countries, close to half the procedures performed in 2014 were among boys younger than 15 years. Kenya's new strategic and operational plan will emphasize sustainability, including strengthening early infant male circumcision as part of maternal, neonatal and child health care services. The United Republic of Tanzania has also been carrying out operational research on further strengthening demand for voluntary medical male circumcision and has successfully completed a pilot project for implementing early circumcision among male infants. Kenya is focusing operational research on increasing demand for the intervention and on the feasibility and acceptability of new male circumcision devices.

Fig. 2.5 Cumulative numbers of voluntary medical male circumcisions performed for HIV prevention in 14 countries in eastern and southern Africa, 2008–2015



Sources: WHO progress brief: voluntary medical male circumcision for HIV prevention in priority countries of east and southern Africa (21), Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and updates received from health ministries (situation as of September 2015).

^a Data are not complete as no official estimates for 2015 were released yet for Malawi and Zambia.

How we can close the existing gaps

Campaigns using mobile and outreach sites have successfully increased the uptake of voluntary medical male circumcision (22), especially in places where male circumcision has not been traditionally practised. Service packages that are more relevant and attractive to youth are important for reaching new cohorts of adolescents (Box 2.2).

Initiatives that target specific age groups and that integrate male circumcision with other health services for men would extend the recent increases in uptake. Necessary enhancements include strengthening commitment and leadership from political and community leaders, promoting increased social acceptance and demand for the procedure and putting safe and simple male circumcision methods to wider use (23).

Action and innovation to speed up progress

- Strengthen the integration of voluntary medical male circumcision into national health and HIV programmes, and ensure strong national leadership, partnerships and monitoring to reach and sustain at least 80% coverage.
- Use voluntary medical male circumcision services and initiatives to promote and deliver broader HIV prevention services for adolescent boys and men.
- Innovate with new methods for simple and safe male circumcision, including the use of prequalified male circumcision devices that enable mid-level health-care workers to perform the procedure.

2.1.3 Eliminating the mother-to-child transmission of HIV

The rate of mother-to-child transmission of HIV has been cut by more than half between 2000 and 2014. Some African countries are approaching the very low mother-to-child transmission rates achieved in high-income countries.

About 1.4 million HIV infections in children were averted between 2000 and 2014, with more than 1 million of them during 2010–2014. Increasing use of more effective drugs is boosting the impact of increased ARV medicine coverage.

However, PMTCT services lag in some countries with a high burden of HIV infection, including Angola, Cameroon, Central African Republic, Chad, the Democratic Republic of the Congo and Nigeria.

Greater implementation of option B+ (providing lifelong ART to all pregnant and breastfeeding women living with HIV regardless of CD4 count or WHO clinical stage) would streamline, simplify and expand the use of ARV medicines for preventing mother-to-child transmission and protecting pregnant women's own health.

The reduction in rates of mother-to-child transmission of HIV in the past 15 years ranks among the outstanding achievements of global HIV efforts. Rapidly expanding services to prevent mother-to-child transmission and the widening use of more efficacious regimens cut the estimated global transmission rate to about 15% in 2014 in low- and middle-income countries overall, an impressive drop from 37% in 2000.

Implementation of the 2011 Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive (24,25) added important impetus to efforts to provide PMTCT services, especially in

countries with a high burden of HIV infection.³ According to Global AIDS Response Progress Reporting (UNAIDS/ UNICEF/WHO), some of these countries are approaching the very low mother-to-child transmission rates that have been achieved in high-income countries.

Scaled-up and improved programmes for preventing the mother-to-child transmission of HIV have led to a substantial decline in the annual number of children acquiring HIV since 2000 in low- and middle-income countries – from an estimated 520 000 [470 000–580 000] to about 220 000 [190 000–260 000] in 2014, a 58% decrease (Fig. 2.6). This contributed significantly to the overall decline in the number of people newly infected with HIV globally in the past 15 years.

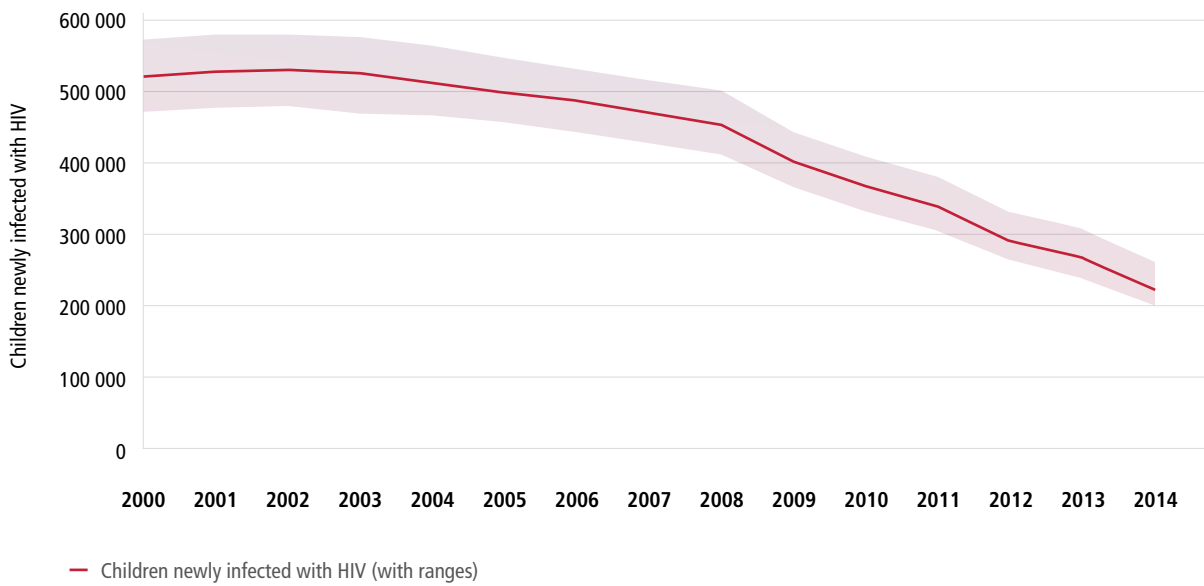
In the 21 priority countries in the African Region,⁴ 48% fewer children younger than 15 years were newly infected with HIV in 2009–2014. South Africa made the greatest progress (76% fewer children newly infected), followed by the United Republic of Tanzania (72%), Mozambique and Uganda (69%), Ethiopia (65%), Namibia (64%) and Swaziland (63%). Seven of the 21 priority countries are expected to achieve the two main Global Plan targets of reducing the number of children newly infected by 90% and reducing the number of mothers dying from HIV-related causes by 50% by the end of 2015.

However, progress has been much slower in several countries with a high burden of HIV infection. For example none of Angola, Cameroon, Chad, Cote d'Ivoire, the Democratic Republic of the Congo, Nigeria and Zambia managed to reduce the number of children newly infected with HIV by more than 40% between 2009 and 2014.

³ The Global Plan included three targets for ARV prophylaxis and therapy: 90% of pregnant women living with HIV receive perinatal ART or prophylaxis; 90% of pregnant women living with HIV eligible for ART for their own health receive lifelong ART; and 90% of breastfeeding mother and infant pairs (either mother or baby) receive ART or prophylaxis.

⁴ The 21 priority countries in the African Region are Angola, Botswana, Burundi, Cameroon, Chad, Côte d'Ivoire, Democratic Republic of the Congo, Ethiopia, Ghana, Kenya, Lesotho, Malawi, Mozambique, Namibia, Nigeria, South Africa, Swaziland, Uganda, United Republic of Tanzania, Zambia and Zimbabwe. Together those countries accounted for about 80% of the estimated global number of children newly infected with HIV in 2014.

Fig. 2.6 Estimated number of children (younger than 15 years) acquiring HIV infection from mother-to-child transmission in low- and middle-income countries globally, 2000–2014



Source: UNAIDS/WHO estimates.

Box 2.3 Eliminating the mother-to-child transmission of syphilis

Untreated syphilis in pregnancy is a major cause of morbidity and mortality, resulting in adverse pregnancy outcomes in more than half the women who have syphilis (26). Since WHO and various partners launched a global initiative in 2007 to eliminate congenital syphilis as a public health problem (27), 60% of reporting countries have implemented a national strategy for eliminating the mother-to-child transmission of syphilis (28). Expanding service coverage led to a 38% decline in maternal and congenital syphilis prevalence globally (18% when the large reduction in India is excluded) from 2008 to 2012 (29). Cuba eliminated the mother-to-child transmission of syphilis and HIV in 2015 based on WHO validation criteria (30), and several more countries are promising candidates for eliminating the mother-to-child transmission of HIV and syphilis.

However, in 2014 nearly half (37 of 85) the countries still reported a prevalence of syphilis infection of 1% or higher among women attending antenatal care services. Nearly one third (27 of 89) of countries reported testing fewer than 50% of pregnant women at any time during their pregnancy in 2014, highlighting the need in many countries for continued efforts to increase testing coverage, particularly in the African Region.

Increasing HIV testing for pregnant women

Testing uptake among pregnant women has increased, especially in countries with a high burden of HIV infection. Testing coverage exceeds 90% in many of those countries.

Testing is a vital first step for linking pregnant women living with HIV into the series of services that can prevent the mother-to-child transmission of HIV and protect their own health.

About half of the pregnant women in low- and middle-income countries had an HIV test and received their test results in 2014 – up from 8% in 2005 but well short of the required 95% coverage. Testing coverage was much higher in eastern and southern Africa, exceeding 90% in several countries in which HIV testing at antenatal clinics is routine. In Botswana in 2014, for example, 91% of pregnant women were tested for HIV and received their results. This enabled Botswana to ensure that 90% of pregnant women living with HIV received ARV medicines to reduce the risk of mother-to-child transmission. Four Global Plan priority countries (Côte d'Ivoire, Mozambique, Uganda and Zimbabwe) surpassed 95% coverage of HIV testing for pregnant women in 2014.

Elsewhere in the African Region, testing coverage is still variable and was less than 40% in Angola, Central African Republic, Comoros, Congo, the Democratic Republic of the Congo, Eritrea, Guinea, Madagascar and Mauritania in

2014. The regional contrast is striking: about three quarters of pregnant women in eastern and southern Africa knew their HIV status in 2014 versus slightly more than one third in western and central Africa.

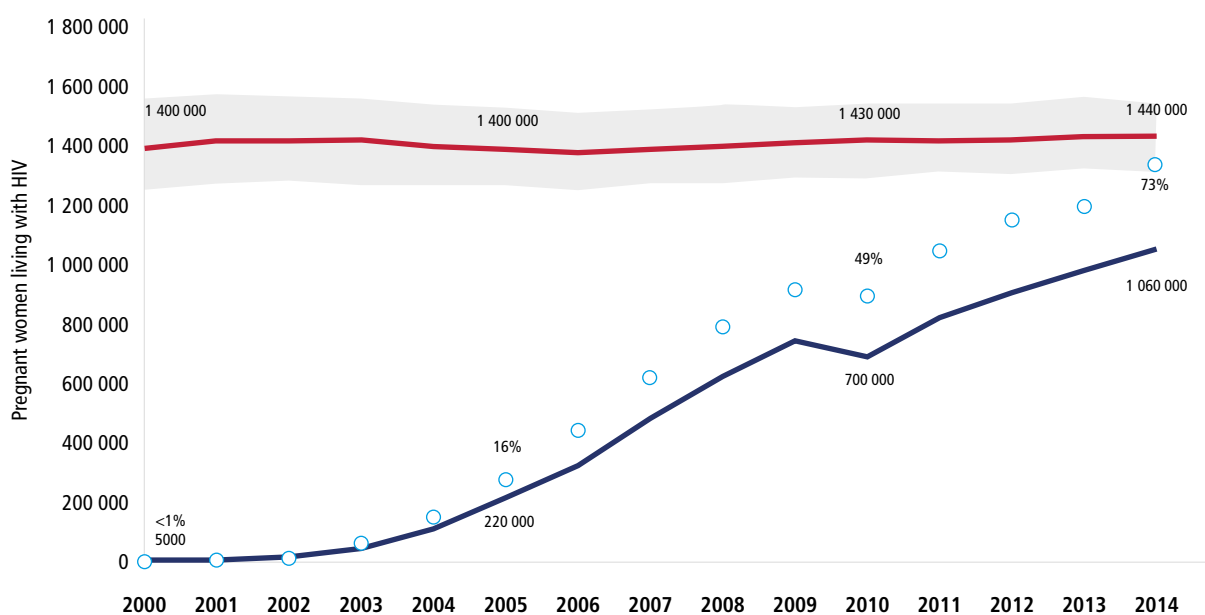
In addition, settings with a high burden of HIV infection pose a significant risk of pregnant women acquiring HIV during pregnancy and while breastfeeding. This makes it necessary to re-test women periodically throughout the period of mother-to-child transmission risk after they had initially tested HIV-negative (31).

Access to antiretroviral medicines for preventing mother-to-child transmission is increasing...

Almost three quarters (73%) of pregnant women living with HIV received ARV medicines for preventing the mother-to-child transmission of HIV in 2014, up from 8% a decade earlier. The use of more effective regimens is boosting the overall impact of that achievement.

A core target of the Global Plan is to provide ARV medicines to 90% of pregnant women living with HIV by the end of 2015. Of the estimated 1.5 million [1.3 million–1.6 million] pregnant women living with HIV in low- and middle-income countries in 2014, 73% [68–79%] received ARV medicines for preventing the mother-to-child transmission of HIV (not including single-dose nevirapine, which WHO no longer recommends). Coverage has increased steeply (Fig. 2.7).

Fig. 2.7 Number of pregnant women living with HIV in low- and middle-income countries and number and percentage of them receiving ARV medicines for PMTCT, 2000–2014^a



— Number of pregnant women living with HIV needing ARV medicines for PMTCT
 — Number of pregnant women living with HIV receiving ARV medicines for PMTCT
 ○ Percentage coverage

--- Lower and upper uncertainty bounds

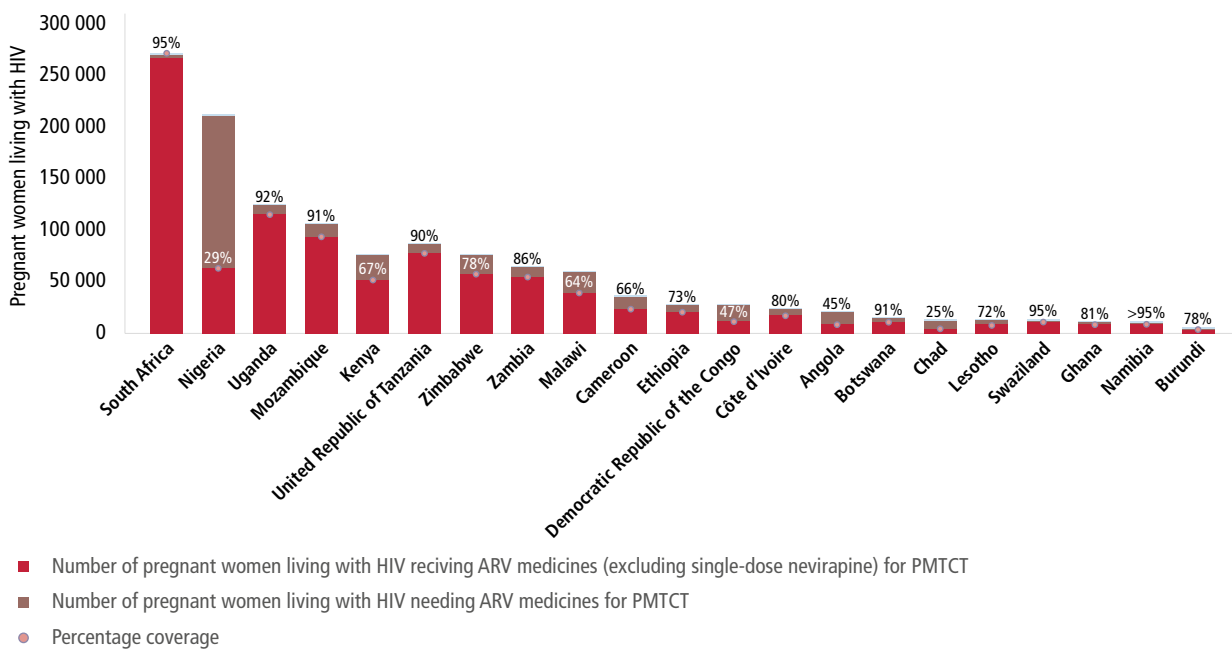
Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO); validation process for the number of pregnant women living with HIV receiving ARV medicines for preventing the mother-to-child transmission of HIV; and UNAIDS 2014 estimates for the number of pregnant women living with HIV.

^aBased on the use of different ARV medicines according to recommendations that have changed over time. Notably, single-dose nevirapine is included in the data for 2000–2009.

In the 21 Global Plan priority countries in the African Region, 77% of pregnant women living with HIV received ARV medicines in 2014. Botswana, Mozambique, Namibia, South Africa, Uganda, the United Republic of Tanzania and Swaziland are among the priority countries that have reached the 90% target for maternal ARV medicine coverage, while Burundi, Côte d'Ivoire, Ghana, Zambia and

Zimbabwe are closing in on that target (Fig. 2.8).⁵ However, inadequate coverage of ARV medicines is a major stumbling block in several other countries with a high burden of HIV infection. In Angola, Chad, the Democratic Republic of the Congo and Nigeria, fewer than 50% of pregnant women living with HIV received ARV medicines to prevent mother-to-child transmission in 2014.

Fig. 2.8 Coverage of ARV medicines for PMTCT in the 21 Global Plan priority countries in the WHO African Region, 2014



Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS 2014 estimates for the number of pregnant women living with HIV.

Poor adherence to ARV medicine regimens and loss to follow-up, especially during breastfeeding, still leave infants at risk of acquiring HIV infection. In 2014, the average rate

of mother-to-child transmission was 5% at six weeks in the 21 priority countries in the African Region but almost tripled to 14% at the end of the breastfeeding period.

Box 2.4 Integrating programmes for preventing the mother-to-child transmission of HIV in Rwanda

By integrating its PMTCT programme with maternal and child health services, Rwanda has adopted a more family-centred approach that includes strategies for reaching partners and other family members with HIV testing services (32). The shift began by setting up teams in clinics to devise and assess new approaches and then share the lessons more widely (33). The methods that proved especially successful included strongly emphasizing counselling to encourage HIV testing, increases in the number of personnel at clinics when antenatal services are being provided and measures to streamline patient flows, cut waiting times and assure confidentiality.

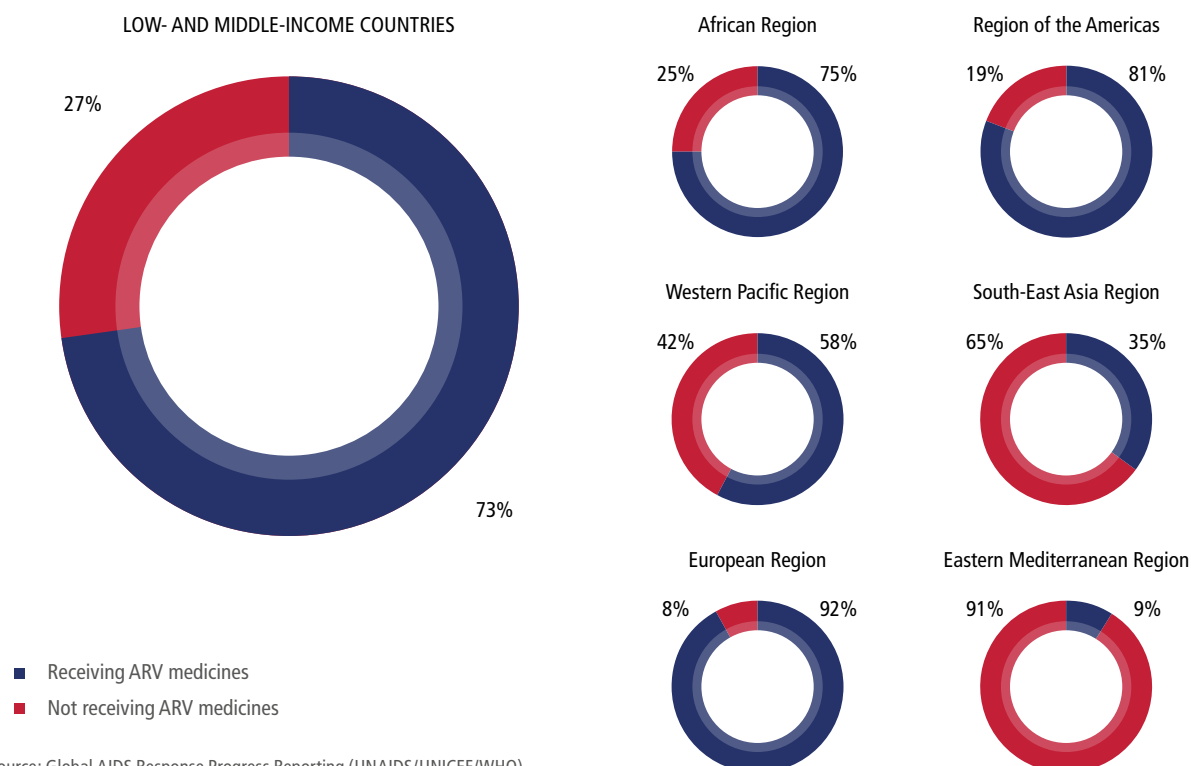
Uptake of HIV testing and PMTCT services among pregnant women rose to above 90% at the 18 clinics implementing the new approaches, and by 2009 more than 80% of male partners were also taking HIV tests (versus 16% in 2003) (34–36). This family-centred approach, and the intensive sharing of lessons, has helped reduce the HIV prevalence among infants in some Rwandan districts to as low as 3.2% at their six-week immunization visit (32).

⁵ This refers to the ARV medicine coverage target for PMTCT for the perinatal period. The postnatal ARV medicine coverage target for PMTCT of 90% has not necessarily been met in these countries.

In low- and middle-income countries overall, coverage of ARV medicines was highest in the WHO European Region at 92% [76 to >95%] followed by the Region of the Americas at 81% [69–95%] and the African Region at 75% [69–81%], as shown in Fig. 2.9. The Western Pacific

Region has made progress, with coverage in 2014 at 58% [43–82%], but coverage was a low 35% [31–41%] in the South-East Asia Region and only 9% [7–13%] in the Eastern Mediterranean Region.

Fig. 2.9 Percentage of pregnant women living with HIV who received antiretroviral medicines in low- and middle-income countries and by WHO region, end of 2014



Source: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO).

Box 2.5 Lessons learned: the shift to option B+

Malawi's success in offering lifelong ART to all pregnant women who test HIV-positive for HIV (option B+) has led to a major shift in PMTCT strategies. In Malawi, the approach led to significant increases in the percentages of pregnant women living with HIV enrolling and being retained in PMTCT programmes (37) and to major increases (eight-fold in the first year of implementation) in the number of pregnant or breastfeeding women starting ART (38). Option B+ was also found to be highly cost-effective (39).

Malawi's innovation has been converted into global guidance and adopted by dozens of other countries (40). In 2013, WHO recommended that all pregnant and breastfeeding women start triple ART immediately at diagnosis and then either continue until the end of the exposure period (option B) or remain on lifelong ART (option B+). By 2015, most low- and middle-income countries were piloting, rolling out or fully implementing option B+ (Fig. 2.10), and all the Global Plan priority countries in the African Region were implementing either option B or option B+. Globally, about 80% of pregnant women living with HIV live in countries in which option B+ now features in national policies.



Box 2.6 Gaps remain in preventing HIV in health-care settings

Sustaining measures to prevent the transmission of HIV in health facilities is important. Such transmission mainly occurs through blood transfusions, medical injections, medical waste and occupational exposure. Preventive measures have been reinforced over the past 15 years, to the extent that a small minority of the people newly infected with HIV acquire HIV in these settings.

Country efforts, supported by the Safe Injection Global Network, cut the number of potentially unsafe medical injections by 88% in low- and middle-income countries between 2000 and 2010. As a result, the absolute numbers of HIV and hepatitis C infections attributable to unsafe medical injections fell by more than 80% during this period (48).

More can be done. Unsafe injections accounted for an estimated 0.7–1.3% of the people newly infected with HIV globally in 2010 (48). Unsafe medical injections can be eliminated entirely, thereby also removing the risk of injection-related HIV, hepatitis B and hepatitis C infections.

Similarly, blood safety remains inadequate in some countries. The HIV prevalence in blood donations in 2012 was estimated to be 0.12% in middle-income countries and 0.85% in low-income countries versus 0.002% in high-income countries. It is worrisome that about 25 countries remain unable to screen all donated blood for one or more of HIV, hepatitis B and hepatitis C. Irregular supply of test kits is one of the most commonly reported barriers to screening (49).

2.1.4 Reaching key populations with HIV prevention services

More than one in three of the people newly infected with HIV in 2014 were associated with key populations.

Proven and affordable methods exist for preventing HIV infection in key populations, but they are not in wide enough use to have a major impact. Legal and social barriers to wider access remain widespread.

The number of people newly infected with HIV among key populations remains unacceptably high. An estimated 35% of new adult HIV infections in 2014 were associated with those populations (8). Proven and affordable interventions are available (50), but many countries do not implement them at all or do so on a scale that is insufficient to have a significant impact.

Studies estimate that men who have sex with men are 19 times more likely to be living with HIV than the general population (51), and female sex workers are 14 times more likely to be living with HIV than other women (52). A recent review of evidence from 15 countries (53) found that as many as 20% of transgender people are living with HIV, and an estimated 3% of imprisoned people globally are living with HIV (compared with 0.6% prevalence in the world's general population). The prevalence of HIV, TB and hepatitis C among prisoners is especially high in countries with high rates of incarceration of people who use drugs (54).

Many men who have sex with men continue to acquire HIV infection, including in countries with longstanding prevention and treatment programmes (9–11,55,56). HIV prevention efforts for men who have sex with men are

unevenly unavailable, especially in the African Region, where government-sponsored HIV services for men who have sex with men are rare and the criminalization of sex between men is on the rise. Few countries in the African Region (Madagascar, Mozambique, Rwanda and South Africa among them) do not have legal provisions that criminalize sex between men (57).

Despite notable successes in protecting female sex workers against HIV in Cambodia, the Dominican Republic, India and Thailand, for example, many countries continue to report a high prevalence of HIV infection in this population. The effectiveness of community-based prevention projects for sex workers is well established (58). In the Democratic Republic of the Congo, for example, community-based interventions for sex workers are increasingly well organized and have helped increase condom use and reduce HIV transmission, with surveys showing a marked decrease in HIV prevalence among sex workers in major cities (59). In many countries, however, such interventions are not implemented at scale, which is a major lost opportunity.

About 13 million [9 – 22 million] people worldwide inject drugs, and about 13% of them are living with HIV (Table 2.1) and more than 60% are living with hepatitis C (54,60). High coverage of needle and syringe programmes and opioid substitution therapy services, in combination with ART and other harm-reduction activities, can have a significant public health impact in places with substantial numbers of people who inject drugs – as shown in British Columbia in Canada, and in Australia, China, the United Kingdom and several countries in western Europe (61–66).



Table 2.1 Estimated number of people who inject drugs and HIV prevalence among them, 2013

Region	Subregion	HIV among people who inject drugs			Prevalence (percentage) Best estimate
		Low	Estimated number Best	High	
Africa		30 000	112 000	1 582 000	11.2
Americas		167 000	237 000	416 000	8.4
	North America	141 000	182 000	248 000	8.8
	Latin America and the Caribbean	26 000	55 000	168 000	7.3
Asia		344 000	576 000	993 000	12.6
	Central Asia and Transcaucasia	26 000	31 000	40 000	7.5
	East and South-East Asia	211 000	329 000	612 000	10.5
	South-West Asia	90 000	196 000	314 000	29.3
	Near and Middle East	1 000	3 000	9 000	3.8
	South Asia	17 000	17 000	18 000	6.8
Europe		373 000	724 000	1 428 000	19.7
	Eastern and South-Eastern Europe	322 000	665 000	1 359 000	22.8
	Western and Central Europe	51 000	59 000	69 000	7.6
Oceania		1 000	1 000	2 000	1.0
Global		915 000	1 651 000	4 421 000	13.5

Source: World drug report 2015 (54).

Note: The regions shown here differ from the WHO regions.

Although increasing numbers of countries are providing needle and syringe programmes or opioid substitution therapy services, coverage is generally poor, even in countries with many people who inject drugs and with high HIV prevalence in these populations (54).

In 2014, needle and syringe programmes were available in 90 of the 158 countries in which injecting drug use has been documented, a slight increase since 2012. However, coverage of needle and syringe programmes is generally too sparse to have a significant impact (54). Only a few countries in Europe and Asia plus Australia and Brazil have achieved high coverage of

needle and syringe programmes: i.e. more than 200 needles or syringes provided per person who injects drugs per year (67).

Some 80 countries were providing opioid substitution therapy in 2014 and 25 countries have scaled up these services since 2012 (67). The European Region is leading the way (Box 2.7); in other regions, opioid substitution therapy services are limited to a few countries. Consequently, only about 8% of people who inject drugs globally have access to opioid substitution therapy (54). Many countries with many people who inject drugs are therefore failing to stabilize or reverse HIV transmission associated with people who inject drugs (68).

Box 2.7 Harm-reduction programmes are making a difference in Ukraine

Ukraine's HIV epidemic grew rapidly after the mid-1990s and became one of the most severe in the European Region. HIV transmission through the use of contaminated drug-injecting equipment was a major factor driving the epidemic. Assisted by external support, Ukraine began expanding prevention programmes for people who inject drugs in 2004. The estimated number of people who inject drugs who were reached with HIV prevention programmes rose from about 50 000 in 2006 to almost 200 000 in 2013, with major increases in the provision of opioid substitution therapy services (69). This key population also accounted for about 6000 of the 55 000 people receiving ART in 2013, a 60% increase since 2006 (70). The latest UNAIDS/WHO estimates indicate that Ukraine's HIV epidemic has slowed significantly. The number of people who inject drugs younger than 25 years diagnosed with HIV infection has dropped sharply (69,70). The removal of some remaining hurdles could facilitate further progress. Laws and policies that penalize drug use, and the manner of their enforcement, are seen as major barriers hindering greater access to and uptake of prevention and treatment services.

It is feasible and advantageous to provide effective HIV prevention measures, such as condoms and sterile injecting equipment, in prisons and other closed settings (71,72). Nevertheless, such services are typically scarce, despite the high risk of HIV infection among prisoners and detainees and the proven effectiveness of basic interventions (71–73). Very few countries provide sterile injecting equipment to prisoners and detainees who inject drugs, and only 28 countries provide condoms in places of incarceration (73).

Punitive laws and practices and systemic neglect continue to expose key populations to avoidable HIV risks and block their access to health and other vital services.

How we can close the existing gaps

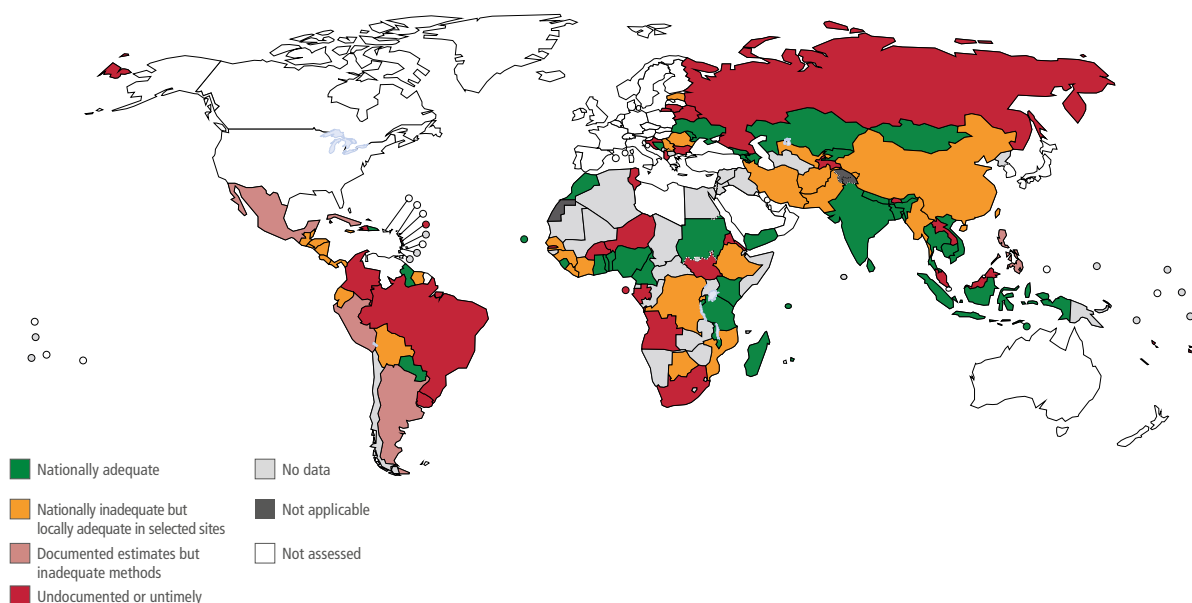
The number of people newly infected with HIV in key populations can be reduced if they are reached with effective prevention interventions. This requires removing discriminatory laws and practices and supporting community mobilization and outreach. In addition, law

enforcement personnel and health workers need to be sensitized to the public health value of HIV services, and evidence-based strategies need to be implemented (50,74).

Understanding the extent and nature of the HIV epidemic among various key populations provides a basis for potentially effective action. Importantly, about 60 low- and middle-income countries currently collect reliable national or local data on the sizes of some key populations (Fig. 2.11).

Comprehensive community-based interventions have reduced HIV incidence among female sex workers (75–77) and men who have sex with men (78). The Avahan experience in India, for example, shows that community-based efforts that improve the social, legal and material conditions surrounding sex work can reduce HIV infection and sexually transmitted infections among sex workers, their clients and the wider public and can protect sex workers against violence from the police and clients (79–82).

Fig. 2.11 Status of population size estimates of female sex workers, men who have sex with men, people who inject drugs and transgender people in low- and middle-income countries, 2015



Source: UNAIDS, Global Fund to Fight AIDS, Tuberculosis and Malaria and WHO. Assessment of availability of subnational data on HIV/STI prevalence, behaviour, coverage of HIV testing and size estimates for key populations in low- and middle-income countries. Geneva: UNAIDS (forthcoming).

Harm-reduction services should be positioned as a key element of the public health response to HIV, and the legal and institutional environment needs to support this approach. The services must be made available on a scale that is sufficient to have an impact on the epidemic in this key population.

Action and innovation to speed up progress

- Implement proven harm-reduction interventions at scale, including needle and syringe programmes and

opioid substitution therapy, and link them to HIV testing and treatment services.

- Remove discriminatory laws, policies and regulations and sensitize health workers and law enforcement personnel.
- Integrate pre-exposure prophylaxis of HIV as an additional component of comprehensive HIV prevention services for men who have sex with men, transgender people and sex workers.
- Promote wider availability of low dead-space syringes for people who inject drugs to reduce the risk of transmitting HIV through needle and syringe reuse.

2.1.5 Using ARV medicines for prevention

The use of ARV medicines holds huge potential for preventing greater numbers of people from becoming infected with HIV.

ART coverage needs to be expanded, with ART initiated sooner after individuals acquire HIV.

Targeted provision of pre-exposure prophylaxis of HIV, in combination with other prevention tools, has great potential to reduce the number of people acquiring HIV further, if scaled up strategically.

The HIV prevention effects of ARV medicines are major and are firmly established (83,84). Effective ART can reduce a person's viral load to levels low enough to prevent onward transmission (85–87). This prevention potential of ART, along with its individual health benefits, has informed WHO's current recommendation that everyone living with HIV should initiate ART, regardless of CD4 cell count (88).

To realize the full preventive potential of ARV medicines, HIV treatment coverage needs to double from the current global level of 40%, people need to initiate ART much sooner after acquiring HIV and they need to be retained on ART until viral suppression is achieved.

Trials have also confirmed the major potential of using a daily dose of ARV medicines to prevent people from acquiring HIV in a wide variety of settings and populations (pre-exposure prophylaxis, or PrEP) (89–93). The latest WHO recommendations therefore recommend the use of daily oral PrEP as a prevention choice for people at substantial risk of HIV infection as part of combination prevention approaches (88).

Despite increasing recognition of the effectiveness of PrEP, it was available in only 13 of the 112 countries surveyed in 2014. Eight of the countries provided PrEP to HIV-negative partners in serodiscordant relationships, and the remainder provided it on a case-by-case basis. Some studies have noted difficulties in achieving sufficient levels of adherence (94–96). If strong adherence can be achieved, focused PrEP promises to be highly cost-effective, as suggested by recent modelling based on South Africa's epidemic (97). Recent experience suggests that PrEP services tend to attract people who are at substantial risk of HIV infection and that high adherence and high efficacy can be achieved (98).

Post-exposure prophylaxis of HIV infection (PEP) is a well established intervention (99) and has been recommended by WHO since 2007 (100). Although most countries have a policy supporting the provision of PEP, only 37 of the 105 countries reporting in the Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) in 2015 stated that PEP was available to anyone in need. The remainder reported that it was available strictly for health-care workers and/or people who had experienced sexual assault. The latest WHO guidelines for PEP, released in 2014, recommend that it be available to all people in need, irrespective of the manner of exposure (101).

How we can close the existing gaps

Both modelling analysis and findings from recent field studies emphasize the need to promote the HIV prevention benefits of ARV medicines as part of a combination HIV prevention approach (102–105).

Maximizing the impact of ART in reducing illness and preventing people from acquiring HIV requires drastically increasing the diagnosis of people living with HIV, ensuring that people who test HIV-positive start treatment early,⁷ and retaining people on treatment to suppress viral load.

Strategies for achieving those improvements are summarized in sections 2.2 and 2.3 and are discussed in detail in the relevant WHO guidelines (44,45,88,102).

PrEP is best deployed as an additional prevention choice within a comprehensive prevention package (107), including male and female condoms, behaviour change communication and sexually transmitted infection services. WHO therefore recommends PrEP as an additional prevention choice for people at substantial risk of HIV infection as part of combination prevention (88).

Maximizing the public health impact of PrEP will require approaches that promote the uptake of ARV medicines and support adherence. Partnerships between health providers and community groups are likely to be important for increasing demand and knowledge about PrEP and to foster understanding about the importance of adherence and monitoring (108).

Countries should also consider more widely using PEP for non-occupational exposure to HIV, including following sexual assault, the sharing of drug-injecting equipment and potential exposure through consensual sex. Simplified guidelines for prescribing of PEP are likely to improve the uptake of and adherence to PEP (109).

Action and innovation to speed up progress

- Integrate the provision of PEP and PrEP with existing sexual health and harm-reduction services for populations at high risk of HIV infection.
- Implement a treat-all approach for people living with HIV and ensure high levels of treatment adherence.
- Innovate to develop further PrEP prevention options, such as long-acting PrEP, oral and topical formulations of ARV medicines and long-acting injectable and vaginal ring ARV medicines, which could help overcome adherence and acceptability challenges.

⁷ A recent phylogenetic study among men who have sex with men highlighted the need for early diagnosis and treatment, finding that individuals were eight times more infectious during the first year of infection compared with the chronic infection period (106).



2.2 HIV testing and linkage to care

An early HIV-positive diagnosis is a crucial entry point to prevention, treatment and care services that can protect people with HIV from illness and prevent further transmission of HIV.

2.2.1 Diagnosing people living with HIV

An estimated 54% [49–58%] of people living with HIV globally know their HIV status (8). More than 150 million people took an HIV test in 2014⁸ as countries used a greater variety of testing approaches.

Almost all countries offer rapid HIV testing with same-day results, and community-based testing is widespread in the African Region.

However, current approaches are not reaching adequate numbers of key populations, a situation that has changed little in the past 15 years.

HIV testing is a linchpin in the continuum of services for HIV prevention, treatment and care. Globally, an estimated 54% [49–58%] of people living with HIV knew their HIV status in 2014. This represents important progress, but a major gap remains: almost half the people with HIV are unaware that they have acquired HIV. The Fast-Track targets call for 90% of people living with HIV knowing their HIV status in 2020 and 95% doing so in 2030.

According to the Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO), in 2014 about 150 million people aged 15 years or older took an HIV test in 122 low- and middle-income countries. This was possible because the opportunities to take an HIV test are more numerous and diverse than ever before, with countries increasingly adapting their testing and counselling policies to reach more people who have HIV (Table 2.2).

Provider-initiated counselling and testing (particularly through antenatal clinics and in TB services) has been especially important for increasing HIV testing coverage (110), with coverage exceeding 80% reported at antenatal care and TB clinics in some countries with a high burden of HIV infection,

Fifteen years ago, individuals in most low- and middle-income countries had limited incentive to take an HIV test, given the scarcity of HIV treatment. As access to ART expanded and rapid testing technologies became available, the uptake of testing and counselling services increased massively, especially in the African Region.

including in Botswana, Ethiopia, Malawi, Uganda and Zimbabwe (111). Couples HIV testing rates in antenatal care settings are still very low, however, and exceed 20% in only a few countries. HIV testing is also being linked with child immunization services and is being offered in paediatric inpatient wards, nutrition support programmes, community childcare services, and other child health services (112,113). Mass testing campaigns have helped increase uptake among people who do not typically use health-care services, including in countries with a high burden of HIV infection such as South Africa, where almost 20 million people took an HIV test in 2010–2012 (114).

Almost all countries now offer rapid HIV testing with results provided on the day of testing, and many are using community-based approaches to do so. Community-based testing is especially widespread in the African Region and has proved to be highly acceptable and effective in reaching large numbers of first-time testers, diagnosing people living with HIV at earlier stages of HIV infection and linking them to care (115). Home-based (door-to-door) testing, using rapid diagnostic tests and led by lay providers, is also increasingly common in the African Region. In 2014, according to the Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO), 61 of 115 (53%) reporting countries had policies recommending lay HIV testing using rapid diagnostic tests (Table 2.2).

Countries are increasingly including key populations in their national HIV testing guidelines. In 2014, the majority of reporting countries stated that their national HIV testing policies addressed key populations (Table 2.2). However, actual implementation has been less impressive. Disappointingly, mandatory or coerced testing, especially among key populations (including prisoners (116) and migrants (117,118)), is still being reported, including in clinical settings (119).

Table 2.2 Key features of national policies on HIV testing in low- and middle-income countries, 2015

	National HIV testing policy or guidelines					
	Recommend provider-initiated testing in all medical contacts	Address HIV testing for key populations	Address HIV testing for adolescents	Recommend rapid tests with same-day results	Recommend community-based HIV testing	Address lay HIV testing using rapid diagnostic tests
Yes	71	100	104	93	85	61
No	41	15	10	19	28	48
Other	1	7	1	3	1	6
Countries reporting	113	116	115	115	114	115

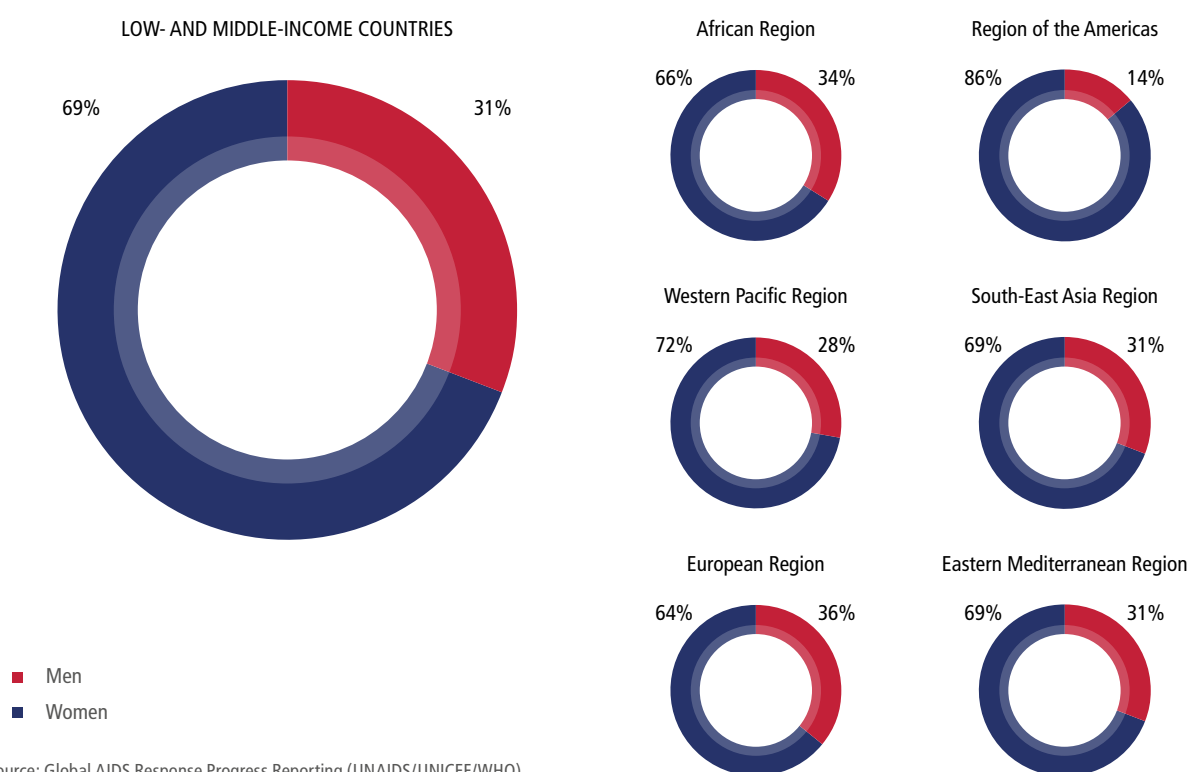
Source: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO).

⁸ Based on the numbers of people tested as reported by countries, but without correcting for the fraction of people who are tested more than once.

Testing approaches need to match the epidemic of a given country or place. Even in countries with low HIV prevalence or concentrated HIV epidemics, testing still tends to occur mainly via antenatal services, which partly accounts for why, in all regions, men are less likely than women to take

an HIV test (Fig. 2.12) – even when they are more likely to be living with HIV (120). Women comprised about 69% of adults who received HIV testing services in 2014 in low- and middle-income countries globally, according to Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO).

Fig. 2.12 Men and women as a proportion of people older than 15 years who received HIV testing services in low- and middle-income countries and by WHO region, 2014



There is increasing concern about the quality of HIV testing, following reports of significant misdiagnosis of HIV status (121). A minority (less than 20%) of countries in a recent 48-country review included WHO-recommended testing strategies in their national HIV testing policies, which may partly account for the misclassifications being reported (122).

How we can close the existing gaps

The WHO consolidated guidelines on HIV testing services (45), which WHO published in 2015, recommend a range of HIV testing approaches that can be introduced and expanded, including using lay counsellors and considering self-testing approaches.

Provider-initiated, facility-based testing remains crucial and can be offered in a range of settings, including primary care clinics, inpatient services and outpatient clinics, including specialist clinics for sexually transmitted infections and TB

clinics, in district and provincial or regional hospitals and their laboratories, as well as in private clinical services.

Community-based testing is effective in reaching large numbers of first-time testers, diagnosing people living with HIV at earlier stages of HIV infection and linking them to care (115,123). In communities, testing services can be offered through home-based index-patient or door-to-door outreach, in schools and other educational establishments (124) as well as in workplaces (especially for men who tend to shun health-care services), places of worship, parks and other venues. In South Africa, mobile units were successful in reaching men, first-time testers and unemployed people, while a stand-alone model reached more working people (125).

HIV self-testing⁹ is an emerging approach that can extend HIV testing to people who may be unable or reluctant to use existing testing services and people who frequently retest (45). As reported recently in Malawi and elsewhere,

⁹ This is a process in which a person who wants to know his or her HIV status collects a specimen, performs a test and interprets the result by himself or herself, often in private.

when HIV self-testing is provided within a community-based approach it can increase the uptake of testing services, be accurate and safe, facilitate linkage to care (126,127) and be highly acceptable (115,128), especially among individuals who are at high risk of HIV infection (129).

Index partner or couple and family testing is one of the most efficient ways of identifying people with HIV, including the male partners of women living with HIV who have been diagnosed through antenatal services (130,131). Although 80% of countries in the African Region reportedly include partner testing in their national policies, it has not been widely implemented. Rwanda is an exception: about 85% of partners are tested as part of antenatal care programmes (Box 2.4).

Diagnosing HIV among adolescents poses special challenges. Survey data from 2008 to 2012 in the African Region indicate that fewer than one in five adolescent girls aged 15–19 years were aware of their HIV status (132). Reviews of age of consent laws could help increase adolescents' access to and use of HIV testing services and uphold their right to make informed choices about their health (45).

Clear steps are available to further improve the quality of HIV testing and minimize misdiagnosis. Countries need to identify approaches that provide the greatest public health benefit and impact and monitor their uptake, acceptability and coverage. Crucially, all HIV testing should follow a validated national testing algorithm and WHO-recommended testing strategies, including retesting all people diagnosed with HIV before initiating ART.

Action and innovation to speed up progress

- Develop programmes for HIV self-testing for people who are unable or reluctant to access current HIV testing services.
- Use simplified, quality-assured point-of-care HIV tests to enable the expansion of HIV testing, including through home- and community-based testing, lay provider testing and self-testing.
- Simplify the testing and counselling process, including test for triage with a high-quality single rapid test and improved linkage to care.
- Innovate approaches to reach men and key populations to close the gaps in testing and linkage to care.

2.2.2 Linking people to HIV treatment and prevention

Large proportions of people who test HIV-positive drop out of care before starting ART, which creates an important gap in the cascade of services.

Linkage to care improves when countries strengthen referral systems, reduce preparatory visits and waiting times and integrate HIV care services with other services, such as for TB and maternal, newborn and child health.

All HIV testing approaches should include effective methods for linking people who are diagnosed with HIV quickly and efficiently to prevention, care and treatment services. Referral systems should also link people who have taken an HIV test to prevention services. Linkage to care, however, has proved to be an especially great challenge.

A substantial proportion of people who test HIV-positive are lost to follow-up before starting ART. Data from the leDEA cohort collaboration show that about 22% of adults were lost to follow-up before ART initiation at four years (133). Important losses to care are occurring also among children, according to studies in the African Region and in Asia (134).

Several factors hinder or delay linkage to HIV treatment and care. They include transport costs and distance to the facility, stigma, fear of disclosure, unreliable referral systems, staff shortages and long waiting times, as well as policy and legal barriers, especially for adolescents and key populations (135). Lengthy and unnecessary delays in determining eligibility for ART and initiating ART worsen the attrition rates (136).

How we can close the existing gaps

The gap between HIV diagnosis and treatment initiation is an important stumbling block in the HIV response. Generally, as more countries move towards initiating ART irrespective of CD4 cell count, pre-ART care should become less important and linkage to ART is expected to strengthen.

Many improvements are available, including strengthening referral procedures and removing unnecessary delays before initiating ART. Countries can minimize the number of clinic visits required (for example, by introducing point-of-care diagnostics (137) and using more flexible staffing models), cut waiting times at clinics (by streamlining work flows), and spread workloads through task-shifting (135,138). Additional options include integrating services, for example with testing and verification of test results provided at a single facility or site together with HIV prevention, care and treatment, TB and sexually transmitted infection screening and other relevant services (139,140). Studies show that integrating HIV care with TB, maternal, newborn and child health or opioid substitution therapy services, for example, tends to improve treatment initiation (135).

Addressing factors that cause poor health-seeking behaviour, especially among men, would also strengthen linkage to care. Intimate-partner notification by testing providers, with permission, is feasible in some settings and could increase HIV diagnosis and promote early referral to care (141,142). Age-of-consent laws may need to be reviewed to determine whether they impede access to HIV testing and treatment for adolescents.



2.3 Towards treatment for all

The 15.8 million people receiving ART in 2015 ranks among the great public health achievements of recent times. The next challenge is to accelerate the scaling up of this treatment so that ART is available to all people living with HIV.

The enormous power of ART for preventing both illness and HIV transmission makes further expanding HIV treatment a priority. Realizing the full potential of ART

requires doubling the global number of people who were receiving ART in 2015.¹⁰ In addition, people will need to start treatment earlier than is currently the norm, and much larger proportions of people receiving ART will need to be retained on and adhere to treatment to achieve and sustain viral suppression. Opportunities for improvement are available all along the cascade of treatment and care services.

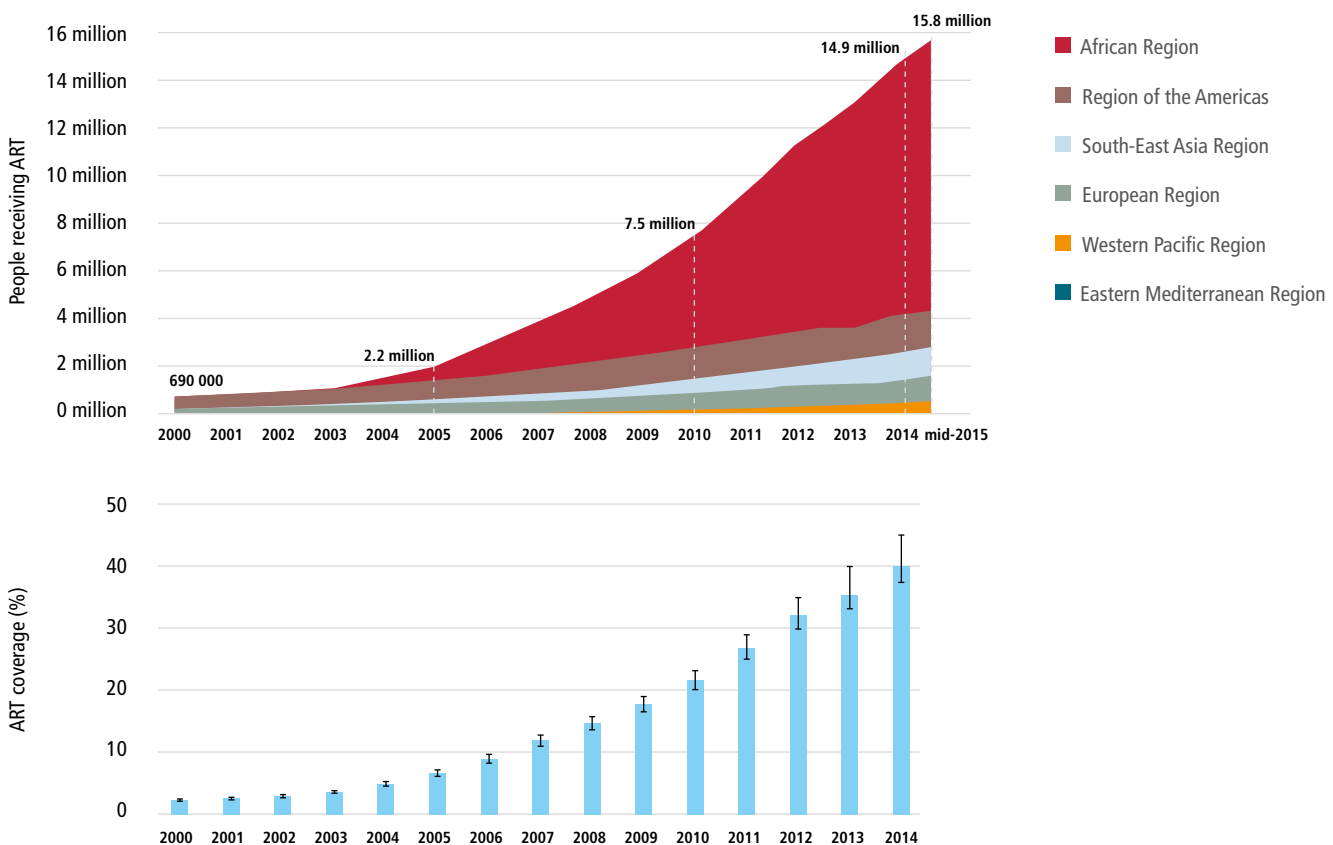
2.3.1 Closing the gaps in treatment coverage

Global coverage of ART increased from about 2% of people living with HIV in 2000 to 40% in 2014. Despite this achievement, more than half the people who should be receiving ART are not yet doing so.

Current stumbling blocks include the large numbers of people living with HIV who have not been diagnosed and the significant proportion of people who drop out of care after receiving a positive HIV diagnosis.

The 15.8 million people receiving ART globally in mid-2015 represents a 23-fold increase since 2000 (Fig. 2.13), an achievement that has drastically reduced the numbers of people losing their lives to HIV each year (Fig. 2.14) and is contributing to reducing the number of people acquiring HIV infection.

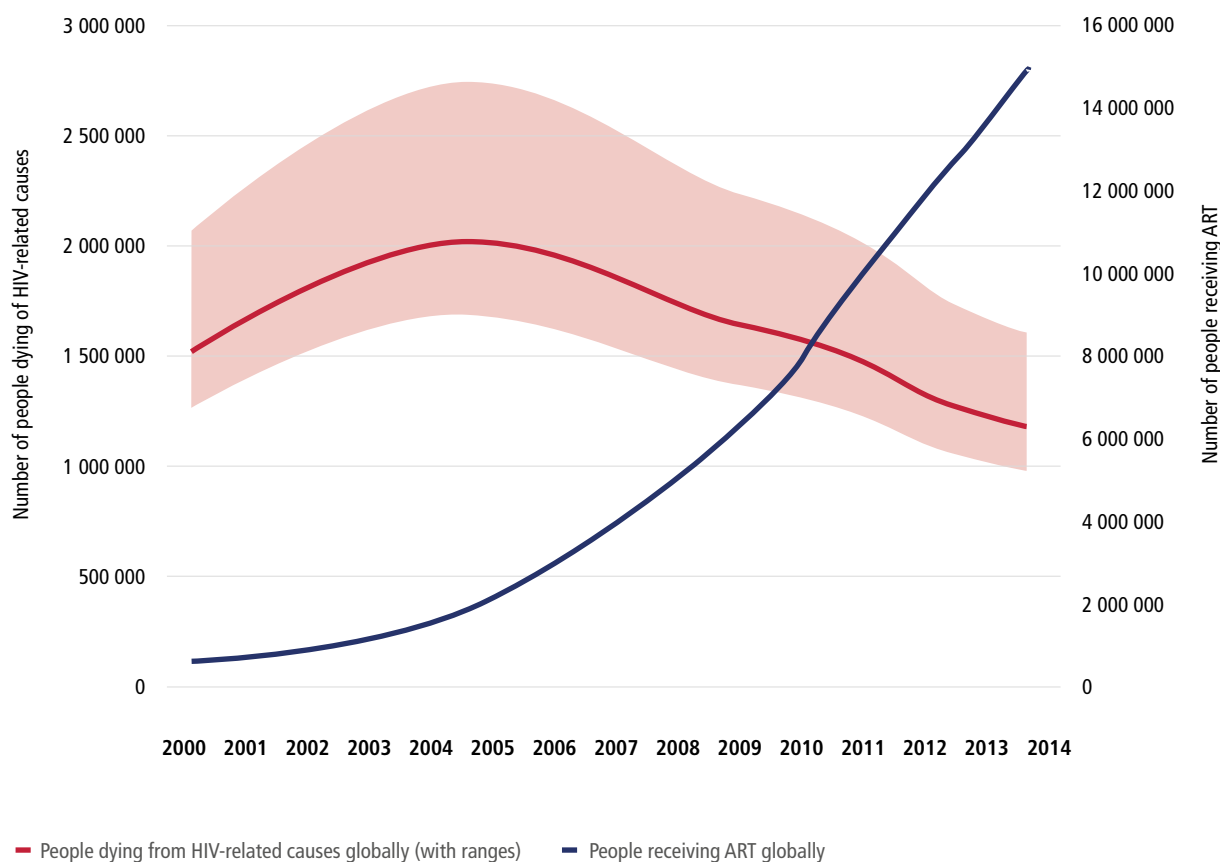
Fig. 2.13 Estimated numbers of people receiving antiretroviral therapy globally and by WHO Region and percentage coverage globally, 2000–2015



Source: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS/WHO estimates.

¹⁰ Informing the 15 million target for 2015 was an assessment of ART needs based on the 2010 WHO ART guidelines (143). Under WHO's revised consolidated guidelines in 2013 (44), as many as 85% of all people living with HIV were eligible for ART in 2014, about 31.3 million people. The latest WHO guidance (88) recommends that all individuals who test HIV-positive initiate ART, regardless of CD4 cell count: about 36.9 million people.

Fig. 2.14 Number of people dying from HIV-related causes annually and numbers of people receiving ART globally, 2000–2014



Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS/WHO estimates.

The Fast-Track targets imply that at least 81% of the people living with HIV should be receiving ART by 2020¹¹ – more than double the estimated global coverage of 40% [37–45%] at the end of 2014 (Fig. 2.15). Closing the remaining gap will require levels of effort and innovation even greater than were mustered during the past 15 years.

Most of the people receiving ART are in the WHO African Region, where an estimated 10.7 million people were receiving ART at the end of 2014 (Fig. 2.16), and more than 11 million were doing so in mid-2015. This is an exceptional accomplishment, considering that fewer than 11 000

people in the African Region were receiving ART in 2000. Treatment coverage reached an estimated 41% [38–46%] in 2014 but was 50% or higher in Algeria, Ethiopia, Kenya, Malawi, Namibia, Swaziland, Uganda, Zambia and Zimbabwe and higher than 60% in Botswana and Rwanda. In South Africa, the country with the largest ART programme in the world (Box 2.8), about 45% of people with HIV were receiving ART by end-2014. In a few countries, however, treatment coverage was still very low: slightly more than 20% in Cameroon, the Democratic Republic of the Congo and Nigeria and as low as 6% in South Sudan and 2% in Madagascar.

¹¹ The Fast-Track targets for 2020 call for diagnosing at least 90% of the people living with HIV, providing ART to at least 90% of the people diagnosed with HIV infection and achieving viral suppression for at least 90% of those receiving ART.

Fig. 2.15 Percentage of people living with HIV who were receiving ART in low- and middle-income countries and by WHO region at the end of 2014

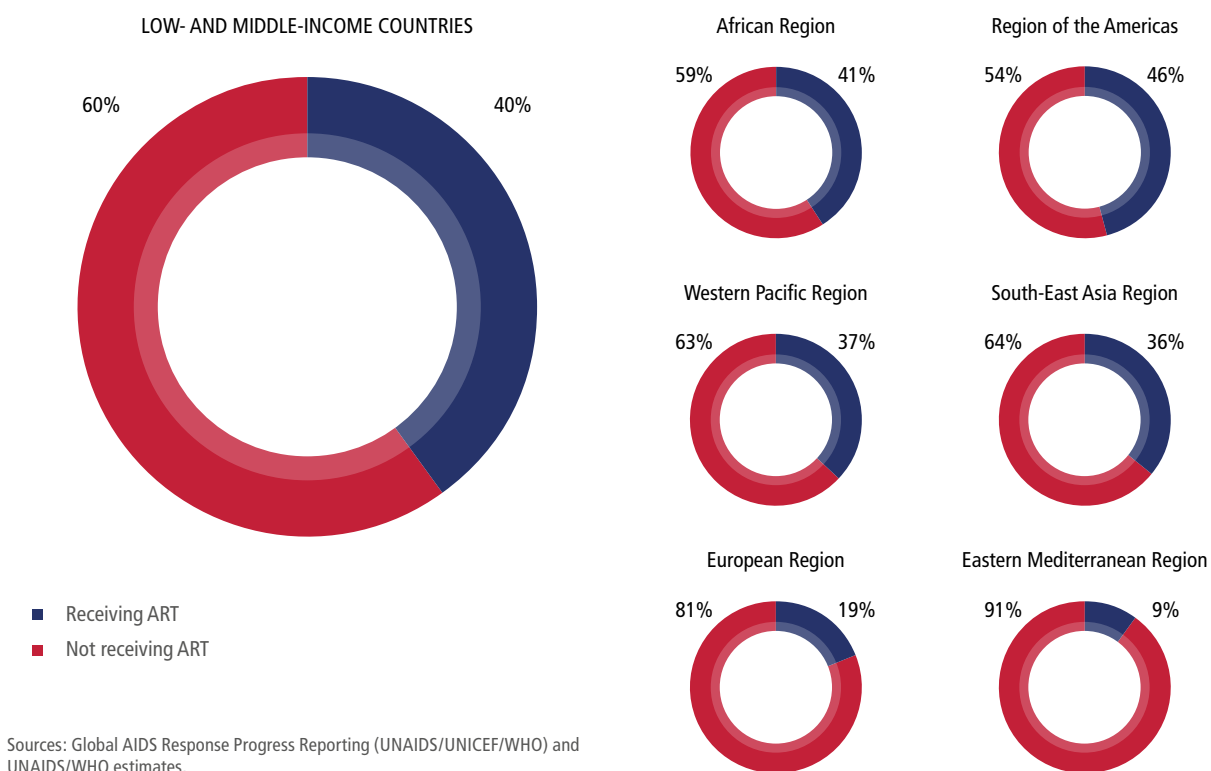
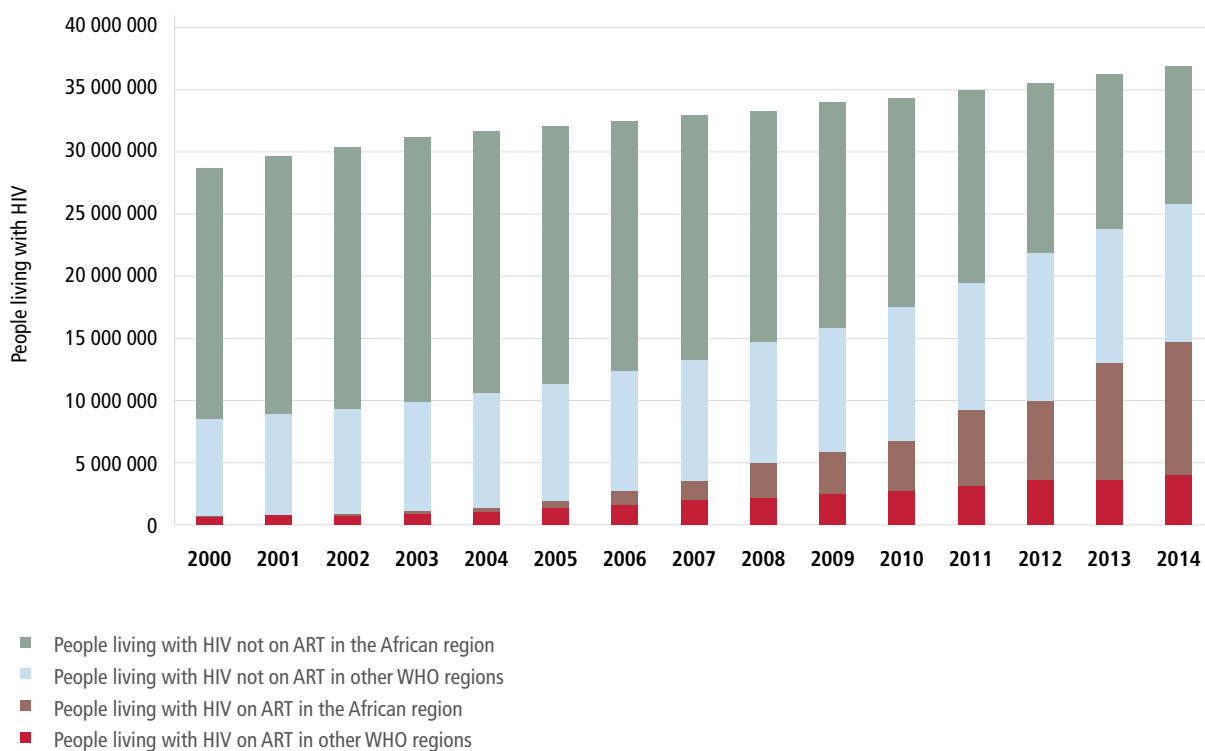


Fig. 2.16 Estimated numbers of people living with HIV receiving ART and people living with HIV but not receiving ART in the African Region and in other WHO regions, 2000–2014



Box 2.8 Building the world's biggest HIV treatment programme

South Africa's treatment access movement linked street protests and community activism with court challenges and high-level lobbying and led to the government announcing in 2003 a countrywide rollout of ART through the public health system.

In slightly more than a decade, South Africa built one of the largest public health programmes in the world. Whereas about 4000 people were receiving ART in 2000, more than 150 000 were doing so in 2005, and this number soared to 3.1 million by end-2014. The achievement emerged from:

- a wide-based social movement for treatment access that went on to play vital roles in supporting the provision of and adherence to treatment;
- using a public health approach to accelerate and extend treatment access into communities, including linking clinical services and community networks;
- successfully negotiating lower prices for HIV drugs and other commodities; and
- developing reliable supply chains.

South Africa's national treatment programme benefited from access to low-cost generic ARV medicines and from the lessons generated by treatment initiatives elsewhere in the African Region and in Brazil. Such countries as Botswana, Malawi and Rwanda have shown that, with sufficient political will, large ART programmes can be introduced nationwide via the public sector. Experiences there and elsewhere have demonstrated the importance of using standardized treatment regimens and simplified procurement, training and patient management (145), while also showing that community and patient engagement is critical to success (146). The importance of decentralizing treatment services and using health workers more flexibly is becoming more evident. Experience has also confirmed that providing treatment and care free of user charges, in contrast to fee-based services, improves treatment uptake and adherence. Further, it became clear that major ARV price reductions were possible and would greatly expand the scope and impact of treatment programmes.

Financial support from the United States President's Emergency Plan for AIDS Relief and the Global Fund to Fight AIDS, Tuberculosis and Malaria helped to develop crucial expertise at delivering and supporting quality-assured ART services in South Africa. Progress was initially steady though slow as systems were built, lessons were assimilated and strategies were refined. After 2008, the treatment programme accelerated rapidly.

The government increased its health spending to the response, which is now largely domestically funded. New methods were used to increase efficiency, and the procurement system was revised to substantially reduce the cost of ARV medicines. South Africa also launched mass HIV testing campaigns that led to major increases in the number of people knowing their HIV status.

Major gains followed when the Department of Health dramatically expanded the number of sites offering HIV treatment, care and support services. ART is now available at virtually every public health facility in the country. This was achieved by revising legislation and by adapting the training and deployment of health workers, which enabled nurses working at the primary care level to initiate and manage people on ART.

Similar lessons and innovations have led to dramatic increases in access to HIV treatment elsewhere in the African Region. There, as in South Africa, important challenges remain, however. The reach and quality of ART services varies between and within provinces, and treatment access is particularly uneven in rural areas. Supply chains are still unreliable in some districts, and retention in care has to improve further (147). Nevertheless, a country that succeeded in placing more than 3 million people on ART in slightly more than a decade will be confident about closing the remaining gaps in its treatment programme. "It always seems impossible until it is done", as South Africa's Minister of Health, Aaron Motsoaledi, put it in April 2015 at the Global Health Sector Strategies 2016–2021 for HIV, STIs and Viral Hepatitis Regional Consultation in Johannesburg, South Africa.

ART coverage in low- and middle-income countries continues to be highest in the Region of the Americas, where treatment began to be scaled up in the 1990s, primarily in Brazil. ART coverage in 2014 was about 46% [40–55%] in the Region of the Americas. The estimated 900 000 people receiving ART in 2014 were triple the 300 000 in 2005 and more than seven times as many as in 2000. Treatment coverage was highest in Cuba (70% [60–86%]) and Chile (64% [52–76%]) and lowest in Paraguay (29% [21–55%]) and the Plurinational State of Bolivia (21% [15–35%]). Brazil's treatment programme, the oldest in the region, is estimated to have resulted in a gain of 1.5 million life-years by 2014 (144).

In the low- and middle-income countries in the European Region, ART coverage in 2014 was low: about 19% [17–22%], less than half the global coverage. However, the number of people receiving treatment has increased substantially, reaching 300 000 in 2014 versus only 16 000 in 2005 and about 4 000 in 2000.

The approximately 1.2 million people who were receiving ART in the South-East Asia Region at the end of 2014 comprised 36% [33–38%] of the people living with HIV. This represented a nine-fold increase since 2005, when HIV treatment began to be rolled out in earnest and only about 135 000 people were receiving ART. In 2000, hardly anybody in the South-East Asia

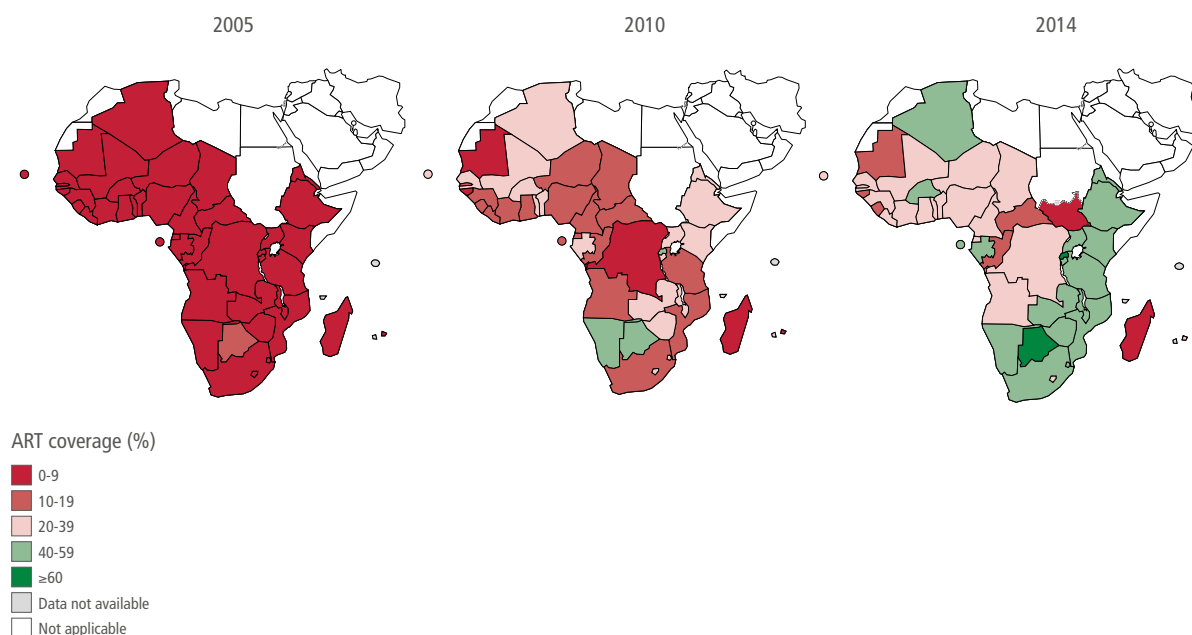
Region was receiving ART. However, the overall regional ART coverage in 2014 masked a wide variation in treatment access, with the percentage of people living with HIV receiving ART ranging from 61% [55–66%] in Thailand to 8% [7–8%] in Indonesia.

ART coverage in the low- and middle-income countries in the Western Pacific Region was about 37% [30–49%] at the end of 2014, when about 490 000 people were receiving ART. This marked an 11-fold increase since 2005. Fewer than 500 people were receiving ART in 2000. Coverage levels ranged from 71% [45–>95%] in Cambodia to 24% [14–69%] in the Philippines and 21% [19–24%] in Malaysia.

In the low- and middle-income countries in the Eastern Mediterranean Region had the lowest ART coverage in 2014, about 9% [6–13%]. The approximately 30 000 people receiving ART were 15 times as many as in 2005, but the treatment scale-up is not keeping pace with the growing HIV epidemics in the Region. Lebanon has managed to arrange treatment for about 43% [3–83%] of the people living with HIV, but coverage in Afghanistan and Pakistan was 5% or less.

Impressive as it has been, treatment is being scaled up unevenly, with some regions and many countries lagging considerably.

Fig. 2.17 Percentages of people living with HIV who were receiving ART in the WHO African region in 2005, 2010 and 2014



Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS/WHO estimates.

Other important disparities in access to ART persist. In the African region especially, men eligible for ART generally are less likely to receive it than women and more likely not to be retained in care (148,149). In the African Region, 47% of adult women living with HIV were receiving ART in 2014, compared with 36% of their male counterparts. HIV testing rates in that region are consistently lower for men, who also tend to access treatment when they have more advanced disease and show poorer adherence to treatment (150,151). As a result, HIV-related mortality rates are higher among men than women receiving ART in most African countries (152).

Sex workers, people who inject drugs, transgender people, men who have sex with men and prisoners face multiple barriers that deny them the benefits of HIV treatment and care services. Indeed many of the factors that put people from key populations at great risk of HIV infection also impede their abilities to access and remain on HIV care and treatment – including stigma and discrimination in both health-care settings and wider communities and punitive laws and practices (Box 2.9) (153,154).

Box 2.9 Despite some progress, stigma and discrimination remain great challenges

Stigma and discrimination faced by people living with HIV have been reduced but not sufficiently. Surveys done for the People Living with HIV Stigma Index (155) show that stigma and discrimination continue to be widespread. In about 40% of countries in which people living with HIV 15–49 years old were surveyed, more than 50% reported experiencing discriminatory behaviour based on their HIV status (8).

Such behaviour has profound consequences. For example, evidence links increases in ART coverage to declining discriminatory attitudes towards people living with HIV (8). However, discriminatory or stigmatizing behaviour among health workers, especially towards people belonging to key populations and people living with HIV, continues to be a significant barrier. Improving the sensitivity of health workers remains important for a successful health sector response to HIV.

Encouragingly, about two thirds of 74 reporting countries in 2014 stated that they had laws in place prohibiting discrimination against people living with HIV. About half the reporting countries had mechanisms to record, document and address cases of discrimination against people living with HIV (8). However, many countries have no HIV-related legal services that might help individuals seek legal redress, which is often complex and unaffordable (13).

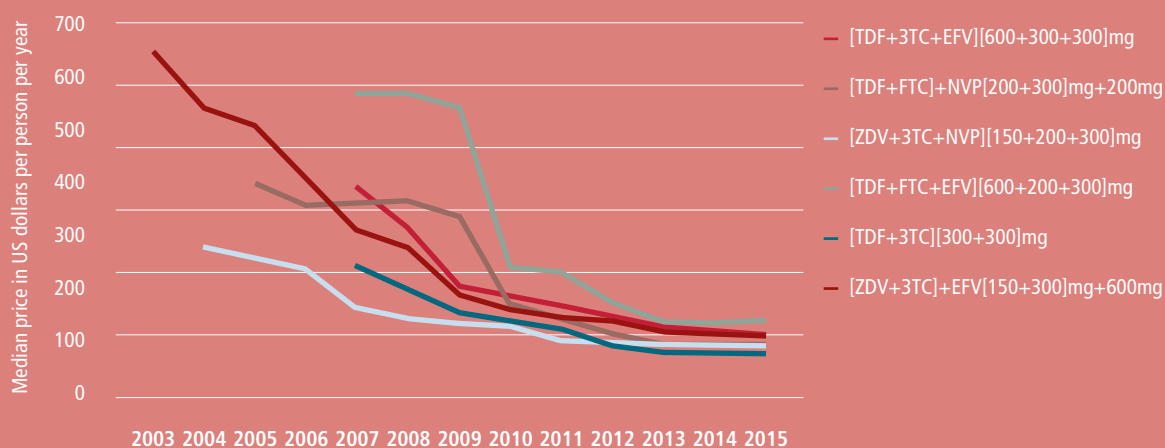
Action to reduce stigma and discrimination also needs to reach beyond people living with HIV to support key populations' access to services. Laws that criminalize the behaviour of key populations, even when not routinely enforced, often feed stigma and social marginalization, legitimize discrimination and facilitate harassment, all of which disrupt the provision and use of HIV and other health services (156,157). In 2014, about 30% of reporting countries stated that they had laws, regulations or policies that presented obstacles to reaching key populations with HIV prevention services (8).

Initiatives that tackle stigma and discrimination in the social, institutional and policy realms are most likely to be effective (158). They include abolishing laws that sanction discrimination and intervening to discourage or prevent discriminatory practices, especially in the health and social sectors (159).

Box 2.10 Affordable treatment – ARV medicine prices declined by 90% in 15 years

Competition among manufacturers and growth of economies of scale in ART programmes have driven down the prices of first-line ARV medicine regimens in most low- and middle-income countries – to less than US\$ 150 per person per year (Fig. 2.18). Generic manufacturers, most of them based in India, supply more than 95% of all ARV medicines in low- and middle-income countries (160). Nevertheless, the costs of ARV medicines remain the largest component of treatment costs at the facility level (161,162), highlighting the need to continue to reduce prices and achieve other savings.

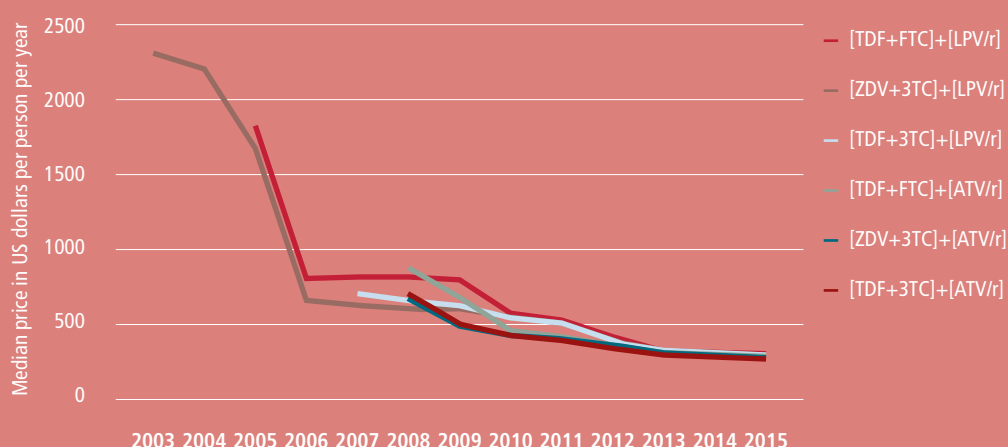
Fig. 2.18 Average prices for first-line ART regimens for adults, 2003–2015



Source: Global Price Reporting Mechanism [online database] (160).
TDF: tenofovir; 3TC: lamivudine; EFV: efavirenz; FTC: emtricitabine; NVP: nevirapine.

The prices of certain second-line regimens are still high but have also declined substantially, especially after 2010 (Fig. 2.19). Most low- and middle-income countries can access second-line treatment at about US\$ 300 per person per year, mostly resulting from the increasing availability of generic formulations. Some countries, however, pay considerably higher prices.

Fig. 2.19 Average prices for second-line ART regimens for adults, 2003–2015



Source: Global Price Reporting Mechanism [online database] (160).
ZDV: zidovudine; 3TC: lamivudine; LPV/r: lopinavir with a ritonavir boost; FTC: emtricitabine; ATV/r: atazanavir with a ritonavir boost.

Options beyond second-line treatment remain extremely costly, however, partly because of the absence of WHO-prequalified generic drug versions. Some third-line regimens cost almost 15 times more than the standard WHO recommended first-line regimen. In addition, company-led access programmes do not generally include middle-income countries outside the African Region, which pay much higher prices. There are also serious concerns that further patent restrictions and a weakening of competition from generic manufacturers might limit options for lowering the price of newer medicines (163). This will require vigilant attention from countries and communities.

Maximizing the benefits of HIV treatment requires a systematic approach to close the gaps at each stage of the service cascade (164,165). Arguably, the greatest single stumbling block currently is the large number of people living with HIV who have not been diagnosed (see

above). But major progress is also needed to maintain the increasing numbers of people receiving treatment over the medium term and to reduce the many people who drop out of care at various points along the treatment cascade after receiving an HIV diagnosis (164,165).

2.3.2 Starting HIV treatment earlier

Early initiation of treatment for people living with HIV maximizes the benefits of ART – at both the individual and population levels.

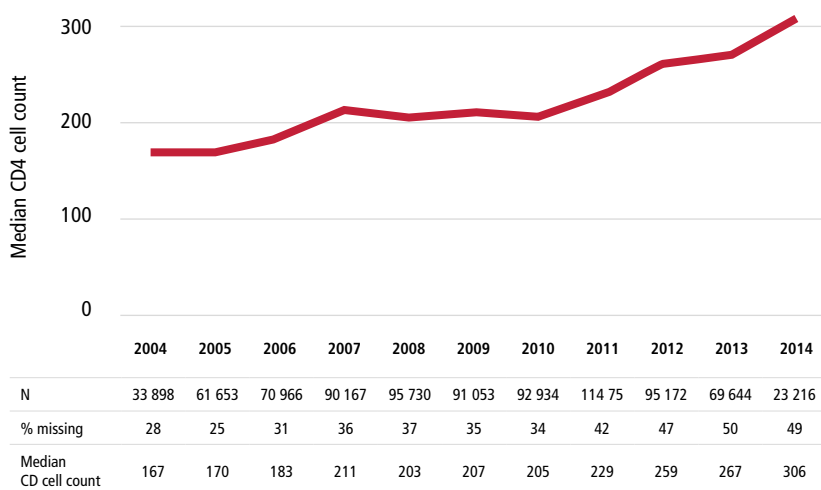
Despite a shift toward earlier initiation of ART in all regions during the past decade, many people still initiate HIV care when they already have advanced HIV disease.

Men are more likely than women to start treatment late, and late HIV diagnosis is especially common among people from key populations.

Adopting the treat-all approach, along with simplified referral procedures, should enable more people to start ART earlier.

The past decade has seen a steady shift towards earlier initiation of ART, with the median CD4 cell count of people starting ART rising in all regions (and especially among women in several regions) (166–168). An analysis of 241 sites in the leDEA cohort collaboration conducted for this report (133) showed that median CD4 count at enrolment in HIV care increased from 167 cells/mm³ in 2004 to 306 cells/mm³ in 2014 (Fig. 2.20).

Fig. 2.20 Median CD4 cell count at enrolment in HIV care at 241 ART sites in central and southern Africa, Asia and the Pacific and Central, South and North America, 2004–2014



Source: Report prepared for the leDEA-WHO Collaboration: global analysis of delays from ART eligibility to antiretroviral treatment (ART) initiation among adults, on behalf of the International Epidemiologic Databases to Evaluate AIDS (leDEA) (133).

Nevertheless, large proportions of people are still enrolling in care late, especially in southern Africa, where more than 80% of people initiating ART between 2004 and 2014 had CD4 cell counts <350 cells/mm³ (133). Men typically enrol in ART at a lower CD4 cell count than women: in 2014, the median CD4 count was 253 cells/mm³ for men versus 342 cells/mm³ for women (133). Late HIV diagnosis is also common among people from key populations (153).

How we can close the existing gaps

People who test HIV-positive should be encouraged to start HIV treatment as soon as possible after their diagnosis. Several countries have taken steps to provide early treatment. There has been notable success in Brazil following its 2013 policy change to initiate ART for everyone living with HIV at any CD4 cell count (Box 2.11) (169).

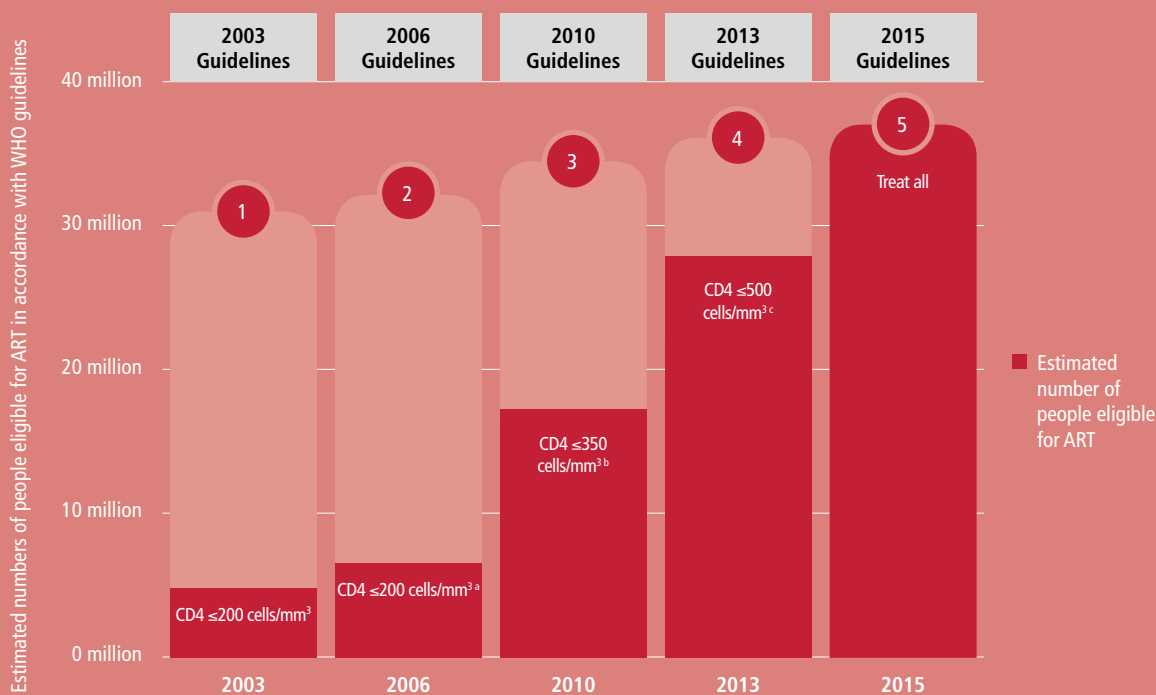
A similar move has been successful in Viet Nam, where immediate initiation of ART irrespective of CD4 cell count for people who inject drugs shows high levels of retention (94%) and viral suppression (91%) at six months.

Uganda's decision to treat all children younger than 15 years regardless of immune or clinical status which was fully implemented in 2014, resulted in a 74% increase in the number of children starting ART; 75% of children and adolescents were reported to have started ART within two days after enrolment into care (170). In Thailand, immediate ART initiation for men who have sex with men and transgender people had high acceptance (83%) and very good rates of retention (92%) and viral suppression (96%) at 12 months. Thailand's 2014 decision to shift to a treat-all approach is expected to further increase its already-high ART coverage levels (Box 2.11).

Box 2.11 The shift to treat all

When global treatment began to be scaled up in earnest in the early 2000s, WHO guidelines defined eligibility for treatment fairly conservatively in an attempt to balance the need for early ART initiation against the practical challenges of implementing large treatment programmes. As the rollout evolved and the effectiveness of ART and the multiple benefits of early treatment became better understood, the public health case for initiating ART early strengthened considerably. Eligibility thresholds for starting ART changed as did the numbers of people considered eligible for ART in accordance with WHO guidelines (Fig. 2.21)

Fig. 2.21 Evolution of WHO guidance on eligibility for ART and number of people eligible for ART in accordance with WHO guidelines, 2003–2015



^aAt CD4 count ≤ 350 cells/mm³: active TB disease and pregnant women living with HIV.

^bAt any CD4 count: active TB disease and hepatitis B coinfection requiring hepatitis B treatment.

^cAt any CD4 count: active TB disease, hepatitis B coinfection with severe liver disease, pregnant women living with HIV and HIV-serodiscordant couples.

Source: WHO/UNAIDS.

The 2013 WHO consolidated guidelines on the use of ARV drugs for treating and preventing HIV infection (44) recommended initiating ART among adults and adolescents living with HIV with CD4 counts < 500 cells/mm³. By the end of 2014, slightly more than half of 144 reporting low- and middle-income countries were implementing the recommendation countrywide. Meanwhile, a minority of countries, about 6%, had opted to treat everyone living with HIV, irrespective of CD4 cell count.

A comprehensive revision of the ARV guidelines in 2015, based on new scientific evidence and lessons from implementation, led to the major new recommendation from WHO that everyone living with HIV at any CD4 cell count should initiate ART (88). The recommendation is based on recent evidence from clinical trials and observational studies – notably that of the recent TEMPRANO and START trials – that show clearly that people who start ART immediately after HIV diagnosis, while their CD4 cell count is high, have a significantly lower risk of HIV-related illness and death (171,172).

The latest recommendation presents a major challenge of diagnosing greater numbers of people living with HIV and linking them successfully and rapidly to HIV treatment and care services. Nevertheless, the experience in Brazil – and other countries – shows that it can be done.

In December 2013, Brazil became the first low- or middle-income country to offer ART to all people living with HIV regardless of their CD4 cell count. As part of the new policy, Brazil expanded its HIV testing programme, with the 1.9 million HIV tests performed in the first quarter of 2014 rising to 2.2 million a year later. The number of people initiating ART rose by 30% in

2014, and there was a 46% increase in the number of people with CD4 cell counts >500 cells/mm³ who started ART in the first quarter of 2015 compared with a year earlier (169).

About 80% of the people living with HIV in Brazil now know their HIV status, 70% of the people who have been diagnosed with HIV have initiated ART and about 65% of the people who have initiated ART have achieved viral suppression (Fig. 2.22) (169).

Fig. 2.22 The HIV treatment and care cascade performance in Brazil, 2014, measured against the 2020 targets



Source: Ministry of Health, Brazil, STD/AIDS and Viral Hepatitis Department, 2015.

Box 2.12 Thailand adopts a treat-all approach but challenges remain

In October 2014, Thailand adopted a national HIV treatment policy of initiating ART for all people living with HIV regardless of CD4 cell count. The treatment is fully reimbursable as part of existing health insurance packages. The almost 272 000 adults and children who were receiving ART at 949 health facilities countrywide in 2014 meant that ART coverage was 61% [55–66%], among the highest in the world. The proportion of people retained in treatment was also high: 83% at 12 months, 78% at 24 months and 75% at 60 months.

Several important challenges remain, however. The high levels of loss to follow-up between HIV testing and ART initiation needs to be reduced. Of the almost 19 000 people who tested HIV-positive in 2014, about two thirds (12 515) were registered in care, and only about 40% (7039) started ART. In addition, many people have been starting treatment late: the median CD4 count of people starting ART was only 111 cells/mm³ in 2013, and two thirds of people newly initiating ART had CD4 counts <200 cells/mm³. This compromises individual treatment outcomes and efforts to reduce HIV transmission.

Action and innovation to speed up progress

- Adopt a treat-all approach for people living with HIV and simplify procedures for referral and access to treatment.

- Initiate ART through integrated care in settings other than HIV clinics, such as TB, maternal, newborn and child health, drug dependence treatment and sexual and reproductive health clinics.
- Develop approaches to increase access to health services and their uptake by men and by key populations.

2.3.3 Achieving viral suppression

Very good viral suppression outcomes can be achieved, including in resource-limited settings.

However, many people drop out of ART before achieving viral suppression. In recent years, only about 45% of adults who started ART achieved viral suppression after three years.

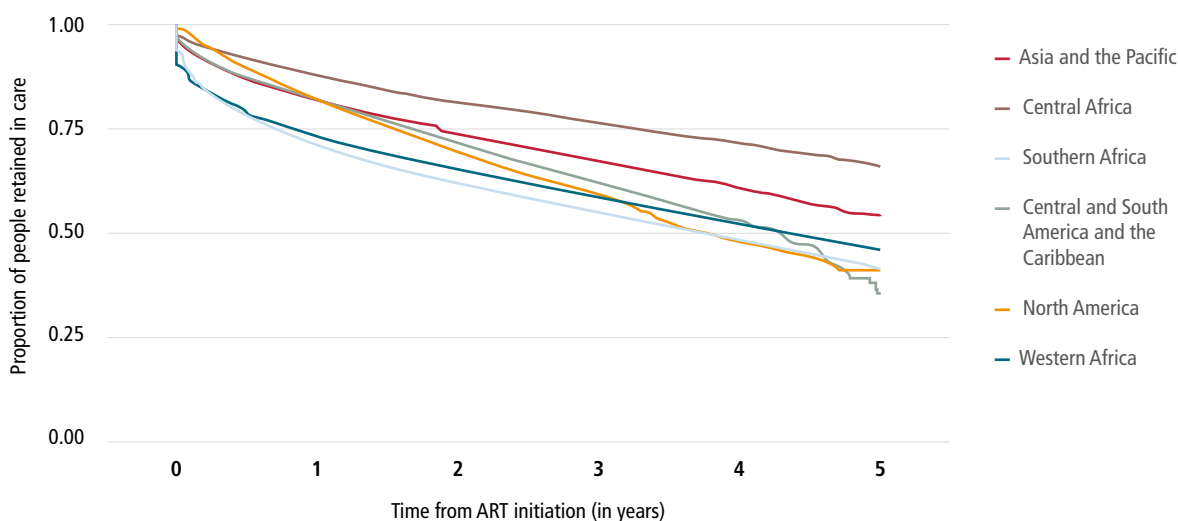
Every effort must be made to retain more people receiving ART in care, prevent treatment interruptions, use robust ART regimens, conduct effective HIV drug resistance surveillance and monitor and avoid treatment failure.

The ultimate goal of ART is to suppress HIV to stop the progression of HIV-related disease and drastically reduce the risk of onward transmission. Studies show that very good viral suppression outcomes can be achieved, including in resource-limited settings (173–177). However, these outcomes are not the norm.

A new review of global data from the leDEA cohort collaboration (133) found that only about 45% of adults who started ART achieved viral suppression (<1000 copies/mm³) after three years. Excluding the people lost to follow-up or who had died from the analysis increased this figure to 92% – which indicates the extent to which late treatment initiation and poor retention in care and adherence diminish the benefits of ART.

After people start ART, losses to follow-up tend to be initially high before gradually declining. Although some of the people lost to follow-up may be shifting in and out of care (165) or may be transferring their care from one facility to another, evidence shows that many people receiving ART drop out of care before achieving sustained viral suppression (Fig. 2.23). This attrition reduces both the treatment and prevention benefits of ART and carries the risk of increasing drug resistance and the cost of care.

Fig. 2.23 ART retention rates up to 60 months in selected low- and middle-income countries by region, 2014



Source: Report prepared for the leDEA-WHO Collaboration: global analysis of delays from ART eligibility to antiretroviral treatment (ART) initiation among adults, on behalf of the International Epidemiologic Databases to Evaluate AIDS (leDEA) (178).

Treatment-related adverse events contribute to poor adherence and treatment outcomes, with toxicity a leading cause of treatment interruption (179). A majority of countries have phased out stavudine (d4T), a move recommended by WHO because of the high rates of toxicity associated with stavudine. According to Global AIDS

Response Progress Reporting (UNAIDS/UNICEF/WHO), most countries have moved towards the WHO-recommended safe, simple and well tolerated first-line ARV medicine regimens and now prefer the use of one-daily-tablet fixed-dose combinations, which has been shown to support adherence (180). WHO continues to support innovation

to improve the tolerability of the recommended regimens, optimizing doses to reduce adverse events (181) and using newer ARV medicines with better safety profiles (182).

Nevertheless, because of HIV's high mutation rate, some degree of HIV drug resistance is anticipated among people receiving treatment, even when appropriate regimens are provided and optimal adherence is achieved (183). The emergence of such HIV drug resistance must be monitored and addressed (see Box 2.13) (180).

How we can close the existing gaps

Services should be organized to minimize leakage and maximize retention and adherence.

Using simplified, robust and tolerable ARV regimens is vital. Improved patient and case-reporting systems (184,185) and defaulter tracking mechanisms to track and re-engage people who have missed appointments or drug pick-ups (see Box 2.15) would strengthen retention in care (186–188). Routine reviews of pill collection and methods that improve on-time pill collection and appointment-keeping are simple but effective ways of identifying and assisting people who may need additional support (189,190). Other ways to improve adherence include using mobile-phone text reminders (191,192) in conjunction with adherence counselling (193) and providing diary cards and food rations (194,195).

Decentralizing ART services has proved effective for strengthening retention in care in places with high HIV prevalence (196,197) (including for children) (198,199) as has minimizing clinic visits and reducing waiting times (200,201). Dispensing ARV medicines in communities, rather than only at clinics and hospitals, is also effective, especially for retaining men in treatment (202).

Community-supported models of care have been shown to improve the retention of people receiving ART while reducing the burden on formal health systems (203,204). In some studies, retention in care improved for adolescents and young people who attended clinics that provided sexual and reproductive health services (including condoms) or that had adolescent support groups (205). Peer support and counselling, including during interactions between people receiving ART and health workers or when organized into adherence clubs, is a proven strategy for strengthening adherence and has been adopted by many countries with a high burden of HIV infection (192).

WHO guidelines recommend using viral load testing as the preferred approach for monitoring the success of ART and diagnosing treatment failure, in addition to clinical and CD4 monitoring. Point-of-care CD4 testing technology is now available in most countries, and point-of care viral load technology is emerging. WHO continues to work with countries to support the implementation of appropriate combinations of diagnostic approaches and technologies.

Action and innovation to speed up progress

- Simplify models for delivering ART services, including less-frequent clinic visits and medicine pick-ups, and make greater use of community-based methods for delivering ART services.
- Strengthen case and patient reporting to support the retention of people on ART and improve systems for tracing and re-engaging people receiving care.
- Develop new, simplified and more durable, affordable and palatable combination ART regimens.

Box 2.13 The challenge of controlling HIV drug resistance

The emergence of HIV drug resistance¹² has to be minimized to preserve the long-term population-level effectiveness of ART. Drug resistance has been modest, but there are signs that it has been rising in some countries and regions in recent years.

About 7% of people starting ART had some form of resistance to medicine recommended as first-line treatment in 2010, according to data from 40 surveys of pre-treatment HIV drug resistance (37 of which from the African Region) between 2004 and 2010 (206). However, there are signs that pre-treatment HIV drug resistance is increasing in the African Region (207).

Recent analysis of data for more than 50 000 people receiving ART in 111 countries (208) showed the median prevalence of transmitted HIV drug resistance was lowest in sub-Saharan Africa (2.8%) but reached 7.6% in Latin America and the Caribbean, 9.4% in the European Region and 11.5% in North America.¹³

When viral failure is detected, switching rapidly to an effective regimen is vital (209). Routine drug resistance monitoring and surveillance, as set out in the WHO global strategy for the monitoring and surveillance of HIV drug resistance (210), is essential.

¹² HIV drug resistance can be categorized as pre-treatment, transmitted or acquired. Pre-treatment drug resistance refers to individuals with resistance that arose from previous exposure to ARV medicines (for example, ARV medicines for preventing mother-to-child transmission). Acquired resistance stems from drug-selective pressure among people receiving ART and is enhanced by poor treatment adherence, treatment interruption or the use of suboptimal ARV medicines or combinations thereof. Transmitted drug resistance refers to resistance detected among individuals who were recently infected with HIV and had not previously taken ARV medicines.

¹³ The geographical regions used in this study differ from the WHO regions.

Box 2.14 Monitoring early-warning indicators for HIV drug resistance

WHO has identified several programme and clinical factors associated with the emergence of drug-resistant HIV as early-warning indicators of HIV drug resistance. They include practices for prescribing ARV medicines, loss to follow-up and retention on treatment, on-time pill pick-up, on time appointment-keeping, pharmacy stock-outs and viral load suppression. The indicators have been integrated into the WHO consolidated guidelines on strategic information for HIV in the health sector published in 2015 (211).

WHO recommends that all clinics managing people receiving ART monitor these early-warning indicators to identify the programmatic factors that require urgent action. If monitoring all clinics is not feasible, countries can assess the performance of programmes in a representative sample of clinics.

Between 2004 and 2014, 63 countries monitored one or more early-warning indicators, with clinic-level data from more than 7000 clinics showing the following.¹⁴

- **Prescribing practices.** Data from 52 countries show that 99% of 1.1 million people receiving ART who started ART between 2005 and 2014 were prescribed regimens that conformed to national or international guidelines.
- **Loss to follow-up.** Analysis of more than 166 000 records from people initiating ART between 2003 and 2011 in 49 countries shows that almost 20% were classified as lost to follow-up at 12 months. Estimates of loss to follow-up vary by region, but the reported data suggest that it increased during 2004–2012.
- **Retention on ART.** According to data from almost 329 000 records from 50 countries, 74% of the people who initiated ART between 2004 and 2013 remained on treatment after 12 months. Those findings are consistent with a large meta-analysis that observed 78% retention at 12 months (212). The WHO analysis noted important regional variation, with retention rates in the African Region lower (68%) than in other regions.
- **On-time pill pick-up.** People who interrupt treatment for as little as 48 hours can experience viral failure and selection of drug-resistant HIV strains. The records of almost 559 000 individuals receiving ART in 2006–2014 in 34 countries show that 82% of them picked up their prescribed ARV medicines within two days of the date on which they were scheduled to run out of pills.
- **On-time appointment-keeping.** Clinical appointment-keeping has been correlated with other measures of ART adherence (213). Records for more than 110 000 individuals receiving ART in 20 countries in 2006–2012 show that 61% of them attended clinic appointments within seven days of the scheduled date, with the rates varying from 41% in western Africa to 87% in the Western Pacific Region.
- **Pharmacy stock-outs.** ART stock-outs can significantly affect individual- and population-level outcomes. The frequency of stock-outs of ARV medicines varies considerably between regions and countries. Among the 1200 clinics monitored in 30 countries between 2005 and 2013, stock-outs were more frequently experienced in the African Region than in other regions.

Box 2.15 Guaranteeing reliable supplies of ARV medicines and diagnostics

The creation of reliable supply chains for ARV medicines, diagnostics and other commodities has been a vital factor in expanding treatment access. Each year, more than 100 million packs of ARV medicines are shipped from manufacturers to countries around the world and then to thousands of treatment sites, many in remote areas (214). These supply chains have been built in slightly more than a decade, and managing them is an ongoing challenge in many countries, with the difficulties often affecting specific places. Drug stock-outs are among the repercussions; unless remedied quickly, they can undermine treatment uptake and weaken adherence, which can lead to HIV drug resistance.

The frequency of stock-outs of ARV medicines varies considerably between regions and countries, but it has decreased globally. However, among the 1200 clinics monitored in 30 countries between 2005 and 2013, stock-outs were more frequently experienced in the African Region than in other regions. Very low levels of stock-outs were reported in the South-East Asia Regions and Western Pacific Region, and considerable variation was observed in the Region of the Americas.

¹⁴ Clinics may have been counted more than once if rounds of early-warning indicator monitoring were repeated at the same clinic over time. Several factors limit wider generalization from these data. The sample of clinics monitored varied according to resources available, with some countries sampling a small proportion of non-representative clinics and others canvassing most or all clinics. Because different countries report in different years, country and regional differences should be interpreted with caution.

Despite the overall decline of stock-outs, their frequency remains a concern. Any stock-out of routinely dispensed ARV medicines can potentially significantly affect individual- and population-level outcomes. As access to ART expands further and increasing numbers of people start ART at higher CD4 cell counts, medicine forecasting, procurement and supply distribution systems will have to be strengthened to prevent stock-outs.

2.3.4 Closing the gaps in treating children and adolescents

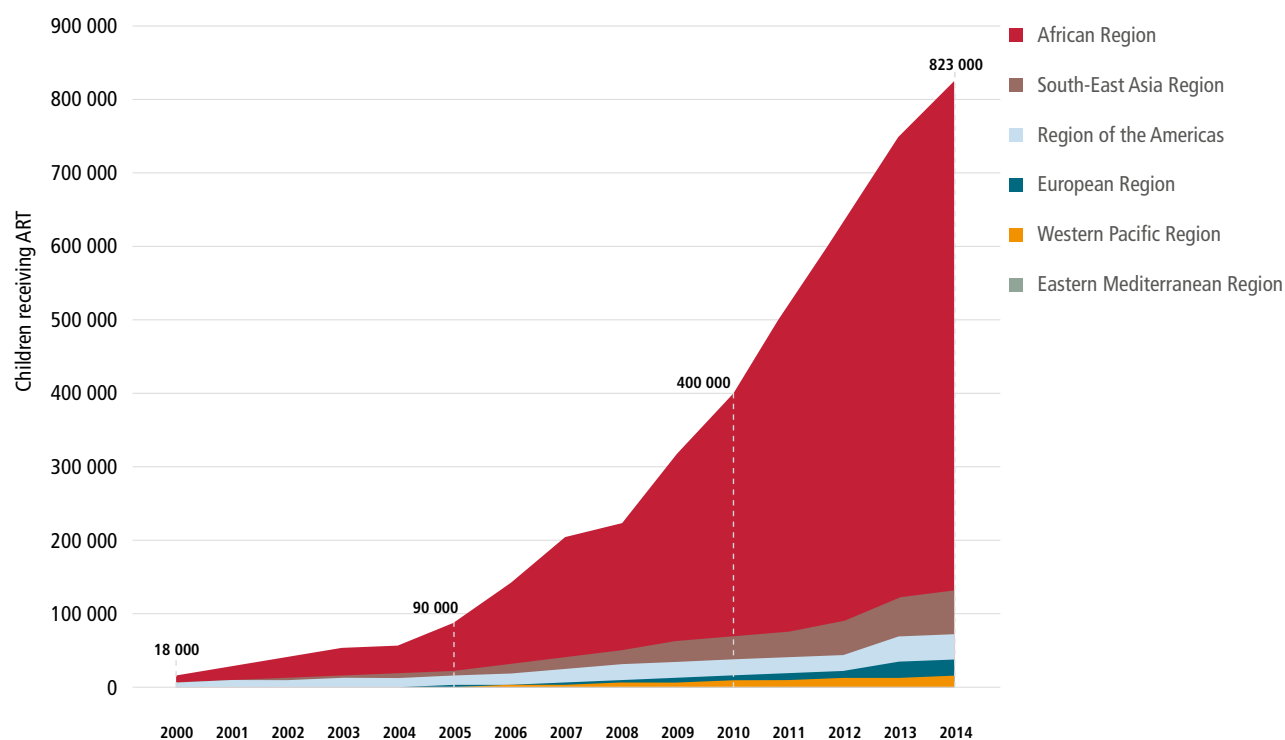
The number of children younger than 15 years who received ART rose from about 18 000 in 2000 to 823 000 in 2014.

However, coverage of ART for children 32% [30–34%] was lower than for adults 41% [38–46%] in 2014, and it was about 30% [28–32%] in the African Region, where 90% of children living with HIV reside.

Expanded access to diagnostic services for infants and young children should also improve ART coverage for children.

Similar to adults, the provision of ART for children younger than 15 year has expanded impressively. The number of children younger than 15 years who received ART expanded from an estimated 18 000 in 2000 to 823 000 in 2014 and more than doubled in 2010–2014 alone. The increase has mainly resulted from progress in the African Region, which is home to almost 90% of children with HIV (Fig. 2.24).

Fig. 2.24 Numbers of children (younger than 15 years) receiving ART globally and by WHO region, 2000–2014



Source: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO).

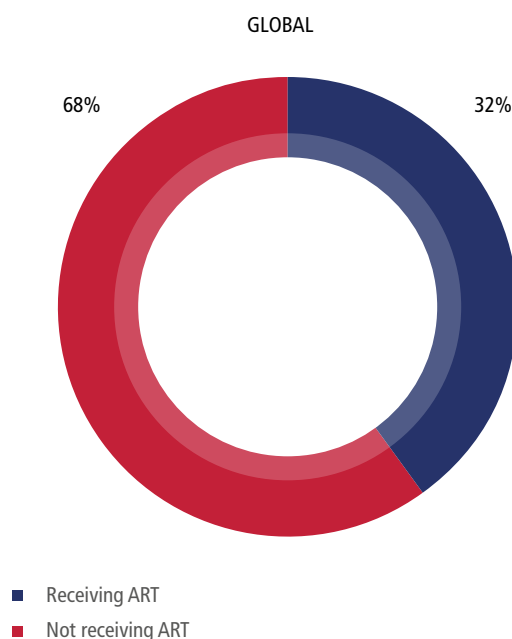
However, coverage of HIV treatment in 2014 was considerably lower for children (32% [30–34%]) than for adults 41% [38–46%]. This gap has narrowed compared to previous years.

In the African Region, about 30% [28–32%] of the estimated 2.3 million [2.2 – 2.5 million] children living with HIV were receiving ART in 2014. There are inspiring examples of improvement – including Botswana and

Namibia (where more than 50% of children with HIV were enrolled in ART in 2014) and Kenya, South Africa, Swaziland and Zambia (with ART coverage of 40–49% among children). However, ART coverage for children in 2014 was between 10% and 20% in several other countries, including Angola, Burundi, Cameroon, Côte d'Ivoire, Democratic Republic of the Congo and Nigeria and less than 10% in South Sudan and Madagascar.

In the Region of the Americas, 74% [65–86%] of the estimated 48 000 [42 000–56 000] children living with HIV were receiving ART. About 33% [30–36%] of the estimated 170 000 [160 000–190 000] children living with HIV in the South-East Asia Region at the end of 2014 were receiving ART, with coverage ranging from 65% [64–67%] in Thailand to 8% [7–10%] in Indonesia. ART coverage was considerably higher in the Western Pacific Region, at about 60% [53–68%] of the estimated 24 000 [22 000–28 000] children living with HIV. Viet Nam achieved coverage of about 85% [73–>95%] and Cambodia 67% [44–>95%] in 2014, but coverage in the Philippines was only 5% [3–19%].

Fig. 2.25 Percentages of children living with HIV globally who were receiving and not receiving ART at the end of 2014



Sources: Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO) and UNAIDS/WHO estimates.

There were major gaps in treatment for children in the low- and middle-income countries of the European Region, where 14 000 children were receiving ART in 2014.¹⁵ About 1500 children with HIV were receiving ART in the Eastern Mediterranean Region in 2014, which amounted to 10% [8–13%] treatment coverage. In 2013, WHO recommended that ART be initiated for all children younger than five years living with HIV regardless of their immune status. As of July 2015, according to Global AIDS Response Progress Reporting (UNAIDS/UNICEF/WHO), 40% of 144 low- and middle-income countries had adopted such a policy. Further progress is anticipated as countries adopt the latest WHO recommendations to treat all people living with HIV regardless of age or immune status (44).

Among the reasons for the comparatively low ART coverage among children are the difficulties many countries have in

diagnosing HIV in infants and young children. Of the 21 Global Plan priority countries in the African Region, for example, only seven were providing early infant diagnosis for more than 50% of HIV-exposed infants in 2014: Namibia (>95%), South Africa (94%), Zambia (94%), Swaziland (81%), Kenya (72%), Lesotho (55%) and Uganda (51%). Coverage was less than 25% in four other countries with a high burden of HIV infection: Burundi, Chad, the Democratic Republic of the Congo and Ethiopia.

There are also obstacles hindering rapid initiation of ART once children are diagnosed with HIV. Large proportions of children younger than two years – as many as two thirds in a large collaborative study spanning Africa, Asia and the Americas – have started ART with severe immunodeficiency (215).

Providing ART to adolescents living with HIV is another current gap. Many children infected perinatally are presenting for treatment for the first time as adolescents and with mounting health problems (216,217). In addition, adolescents may acquire HIV during unprotected sex or by using contaminated drug-injecting equipment.

There are no reliable estimates of the proportion of adolescents living with HIV who are receiving ART, but data from Malawi, Uganda, the United Republic of Tanzania and Zimbabwe suggest that adolescents' uptake of treatment is often lower than for other age groups (218,219). Concerns about side effects or confidentiality, a lack of youth-friendly services and misinformation are often cited as barriers for accessing or adhering to ART. Stigma and harassment pose additional obstacles, especially for adolescents from key populations (220–222). Adolescents who acquired HIV perinatally may have had multiple treatment regimens, which could pose additional challenges.

How we can close the existing gaps

Some of the core improvements needed to expand the uptake of ART among children are closely related to effective PMTCT programmes generally, as shown by countries that have narrowed this treatment gap – such as Botswana, Namibia and South Africa. They have scaled up early infant diagnosis and implemented more effective follow-up of HIV-exposed infants until a definitive serological diagnosis can be made after 18 months of age. Identifying HIV-exposed infants at the six-week immunization visit and improving the education of mothers during antenatal care about infant testing has been found to increase early infant diagnosis (223).

In places with large numbers of children living with HIV, decentralizing ART for children can offer substantial advantages, especially when treatment can be offered at the same sites and with the same providers as other primary health services (224). Methods that combine customized text message alerts sent to mothers with

¹⁵ ART coverage is currently under review for the European Region.

prospective tracking of children exposed to or living with HIV have increased the retention of HIV-exposed infants in care and reduced turnaround times in the processes leading to care (225).

High mortality rates among adolescents living with HIV highlight the need to improve their access and adherence to ART. Reviewing and, if appropriate, reforming laws and policies on consent to services may address some hindrances. HIV services need to be more appropriate for the special needs and circumstances of different groups of adolescents. Greater involvement of adolescents in developing the services intended for them should lead to improvements (226). A multicountry study found that attrition during treatment and care was lowest among adolescents and young people who attended clinics that also provided sexual and reproductive health services (including condoms) or that had adolescent support groups (205).

2.3.5 Tackling comorbidities

Increased HIV and TB interventions prevented about 5.9 million people from dying in the past decade.

Seventeen of the 41 countries with the highest burdens of HIV-associated TB have met the target of reducing HIV-associated TB deaths by at least 50% by 2015 (against a 2004 baseline) – but the target will not be met at the global level.

Viral hepatitis is an increasing cause of death among people living with HIV, even though highly effective biomedical tools are available for preventing and treating viral hepatitis.

As more people are retained on HIV treatment over the long term, dealing with comorbidities is becoming increasingly important. In particular, TB and bacterial infections are the leading causes of hospital admission and death among adults and children living with HIV (227), and chronic hepatitis B and hepatitis C infection are growing causes of morbidity and mortality in several countries among people living with HIV.

Reducing TB mortality among people living with HIV

The increase in and strengthening of joint HIV and TB interventions led to a 22% drop in the number of people dying from HIV-associated TB globally from 500 000 [460 000–530 000] in 2000 to 390 000 [350 000–430 000] in 2014. The implementation of HIV and TB interventions prevented an estimated 5.9 million [5.3 – 6.5 million] people from dying in the past decade (228).

Seventeen of the 41 priority countries with the highest burdens of HIV-associated TB have met the target of reducing HIV-associated TB deaths by at least 50% by 2015 (against a 2004 baseline). However, with current trends, the target will not be met at the global level.

Action and innovation to speed up progress

- Scale up routine early infant diagnosis and strengthen point-of-care technologies and provider-initiated testing.
- Implement task shifting and targeted decentralization by training and empowering nurses and other non-clinician health providers to initiate ART in children.
- Ensure the selection of adequate formulations for children by procuring optimal products to provide safe and effective regimens across age groups.
- Promote age-disaggregated data collection systems to inform programme planning and commodity forecasting.
- Improve formulations for children, including by identifying safe and effective ARV medicine options that are suitable for newborns (younger than four weeks) and fixed-dose combinations for children.
- Tailor ART services to the special needs of adolescents living with HIV.

Despite the progress, TB was responsible for 31% of the estimated 1.2 million HIV-related deaths globally in 2014. The African Region accounted for about three quarters (73%) of the people dying from HIV- and TB-associated causes globally in 2014, with the South-East Asia Region accounting for most of the remainder.

Misalignment of TB and HIV prevention, treatment and care services and a lack of integrated TB and HIV services are holding back progress in many countries. Although HIV testing coverage among people with notified TB globally increased more than 15-fold since 2004, it was still only 51% in 2014 – well short of the 100% target.

Linking people with TB who test HIV-positive to ART can be a challenge, but evidence from a large study in Cape Town, South Africa shows that the risk of premature death can be cut by half when people with HIV-associated TB are identified and initiate ART (229). Co-trimoxazole prophylaxis is another important intervention for protecting people living with HIV (230,231). Globally, 427 000 people with both TB and HIV infection enrolled in co-trimoxazole prophylaxis in 2014 – up from a very small number in 2004 and equivalent to 87% of all people living with HIV with notified TB. Enrolment in co-trimoxazole prophylaxis was especially high in the African Region (89%) and South-East Asia Region (85%). Only 4 of the 41 countries with high burdens of TB and HIV¹⁶ reported that less than 50% of people with both HIV and TB were enrolled in co-trimoxazole prophylaxis in 2014: Côte d'Ivoire (24%), Congo (27%), Indonesia (41%) and Ukraine (44%).

The global number of people living with HIV who started isoniazid preventive therapy rose from about 12 000 people in 2004 to 933 000 people in 2014. South Africa accounted

¹⁶ Thirty-four of the 41 countries with the highest burdens of TB and HIV infection reported these data in 2014.

for more than half the global total. As with TB screening, many countries continue to find it challenging to provide isoniazid preventive therapy and to record and report data on its provision or treatment completion (228). Only 13 of the countries with the highest burdens of TB and HIV reported starting people living with HIV on isoniazid preventive therapy in 2014.

Managing HIV and viral hepatitis

Viral hepatitis is an increasingly significant cause of death among people living with HIV and a significant addition to the burden of disease in its own right, accounting for 1.4 million deaths per year, similar to the number of deaths from HIV. Hepatitis C affects 2–15% of the people living with HIV worldwide (and up to 90% of those who inject drugs), and chronic hepatitis B infection affects an estimated 5–20% of the people living with HIV (232,233). Globally, an estimated 2.8 million [1.6 – 4.6 million] people are coinfecting with HIV and hepatitis C, of whom an estimated 1.3 million [900 000 – 1.4 million] inject drugs. The burdens of HIV and viral hepatitis coinfection are greatest in the African Region and South-East Asia Region (234,235). The viral hepatitis epidemics have been largely neglected, although this situation has begun to change as more countries take advantage of important vaccine and treatment opportunities. WHO is setting targets for the elimination of Hepatitis B and C by 2030.

Dealing with noncommunicable diseases and HIV

People living with HIV are at increased risk of developing a range of noncommunicable diseases as a consequence of their HIV infection or of side effects of their treatment. These noncommunicable diseases include cardiovascular disease, diabetes, liver and pulmonary disease, hypertension and a range of non-AIDS-associated malignancies, notably cancer (236–238). Because of greater access to effective ART, people with HIV are living longer and experiencing the noncommunicable diseases associated with ageing, which is posing new challenges to health-care systems (239).

Women living with HIV have a higher risk of invasive cervical cancer, which can be prevented with appropriate vaccination (240). Rwanda is among the countries that have implemented major human papillomavirus vaccination campaigns in recent years. In 2011–2012, Rwanda fully vaccinated more than 220 000 girls against human papillomavirus, achieving coverage rates of 93–96%. Rwanda has also introduced nationwide screening and treatment programmes – evidence that these interventions are feasible in resource-limited settings (241). Elsewhere in the African Region, however, cervical cancer screening and management remain rare, and coordinated national efforts to address the disease are scarce – including in the

countries with a high burden of HIV infection in eastern and southern Africa (242).

WHO global strategies to be published in 2016 will highlight opportunities for further integrating sexually transmitted infection and viral hepatitis interventions with HIV activities.

How we can close the existing gaps

HIV and TB services need to be integrated more thoroughly. HIV testing coverage among people with notified TB has to increase, and those who test HIV-positive should be linked immediately to ART, especially in countries with the highest burdens of TB and HIV coinfection. Intensified implementation and uptake of key interventions, including TB screening among people living with HIV, isoniazid preventive therapy and co-trimoxazole prophylaxis, will reduce TB-related morbidity and mortality.

Similarly, highly effective interventions exist to prevent, treat or cure viral hepatitis. Hepatitis B infection can be prevented through vaccination (243). Although there is no vaccine for hepatitis C, highly effective hepatitis C prevention interventions exist. Harm-reduction services have been shown to significantly reduce HIV and hepatitis C incidence among people who inject drugs (244,245). New, directly acting antiviral drugs offer cure rates in excess of 90% for chronic hepatitis C infection, and effective suppressive treatment exists for chronic hepatitis B infection, although this generally requires lifelong therapy (245).

Further integrating HIV and sexual and reproductive health services would improve the prevention and treatment of cervical cancer (246). Vaccination, screening and management for cervical cancer should be reinforced.

Chronic HIV care also offers opportunities for screening, monitoring and managing chronic noncommunicable diseases, especially through primary care, and for detecting and managing mental health problems among people living with HIV, including pre-existing mental health problems.

Action and innovation to speed up progress

- Offer routine testing for HIV, TB and hepatitis B and C at all points of contact with health services.
- Combine HIV, viral hepatitis and TB management and implementation in settings with a high prevalence of coinfection.
- Use the Xpert platform for TB, viral load and other testing.
- Innovate health-funding approaches to support the provision of integrated HIV, TB and viral hepatitis services.





CHAPTER 3

THE NEXT 15 YEARS – TOWARDS A SUSTAINABLE PATH TO END AIDS

This chapter looks ahead to the challenges of the next 15 years. It introduces the proposed WHO Global Health Sector Strategy on HIV 2016–2021 and presents five strategic directions for guiding country and global action to end the AIDS epidemic by 2030.

In this chapter

3.1 TOWARDS THE GLOBAL HIV TARGETS FOR 2020 AND 2030

3.2 FIVE STRATEGIC AREAS FOR ACTION

- 3.2.1 Using strategic information for decisions and accountability
- 3.2.2 Selecting the essential package of HIV services
- 3.2.3 Achieving equity and quality
- 3.2.4 Sustainable funding, reduced costs
- 3.2.5 Innovations for acceleration and impact

3.3 CONCLUSION

3.1 Towards the global HIV targets for 2020 and 2030

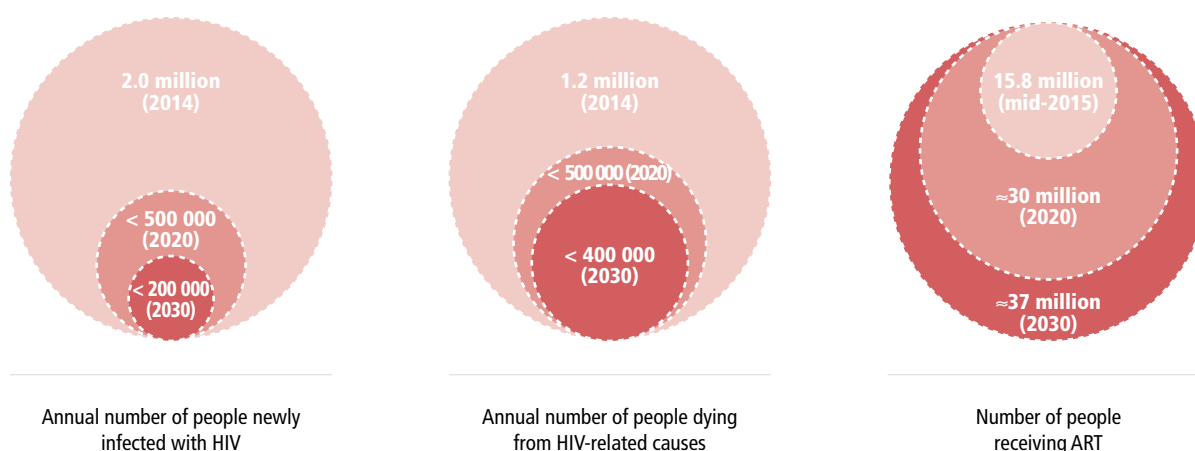
The 2020 and 2030 targets require action and innovation capable of rapidly and dramatically reducing the numbers of people newly infected with HIV and dying from HIV-related causes.

Strong commitment, opportune partnerships and major innovations in technologies and service delivery have brought the world to a realistic prospect of ending the AIDS epidemic as a serious public threat by 2030. That objective is now a global

commitment and features among the targets of the Sustainable Development Goals.

Achieving that goal will require decisive declines in the numbers of people newly infected with HIV infections and dying from HIV-related causes (Fig. 3.1), much more rapidly than in the past 15 years. It will require drastically accelerating the global HIV response during the next five years to reach the milestones set for 2020.

Fig. 3.1 Progress required to reach key 2020 and 2030 HIV targets



UNAIDS modelling indicates that a combination of high-impact prevention packages, expanded testing and treatment services, and strengthened protection of human rights can:

- reduce the annual number of adults newly infected with HIV to less than 500 000 in 2020;
- prevent 28 million adults from becoming newly infected with HIV between 2015 and 2030;
- prevent almost 6 million children from becoming newly infected with HIV by 2030;
- prevent 21 million people from dying from HIV-related causes between 2015 and 2030; and
- avoid US\$ 24 billion of additional costs for HIV treatment.

Formidable gaps separate current HIV responses from the targets. As HIV programmes grow in scale, fresh challenges are also materializing. Nevertheless, as shown in Chapter 2, a strong platform to respond to HIV has been built, and there are great opportunities for mastering the challenges

that lie ahead. Seizing these opportunities will require renewed political commitment, additional resources, technical innovation, and action to ensure that suitable conditions and capabilities exist for further progress.

The proposed WHO Global Health Sector Strategy on HIV 2016–2021 (1) will guide efforts to accelerate and focus HIV prevention efforts, challenge pervasive HIV-related stigma and discrimination, enable people to know their HIV status and provide ART and comprehensive long-term care to all people living with HIV. Closing the gaps systematically along the continuum of services is a priority, and WHO has adapted its strategic information, prevention, testing and treatment guidelines accordingly.

The WHO Global Health Sector Strategy on HIV 2016–2021 is anchored in the sustainable development agenda and positions the health sector response to HIV as vital for achieving several Sustainable Development Goals. It promotes a people-centred approach that is grounded in human rights principles and emphasizes the importance of linking HIV responses with other initiatives to improve health and promote development in equitable ways.

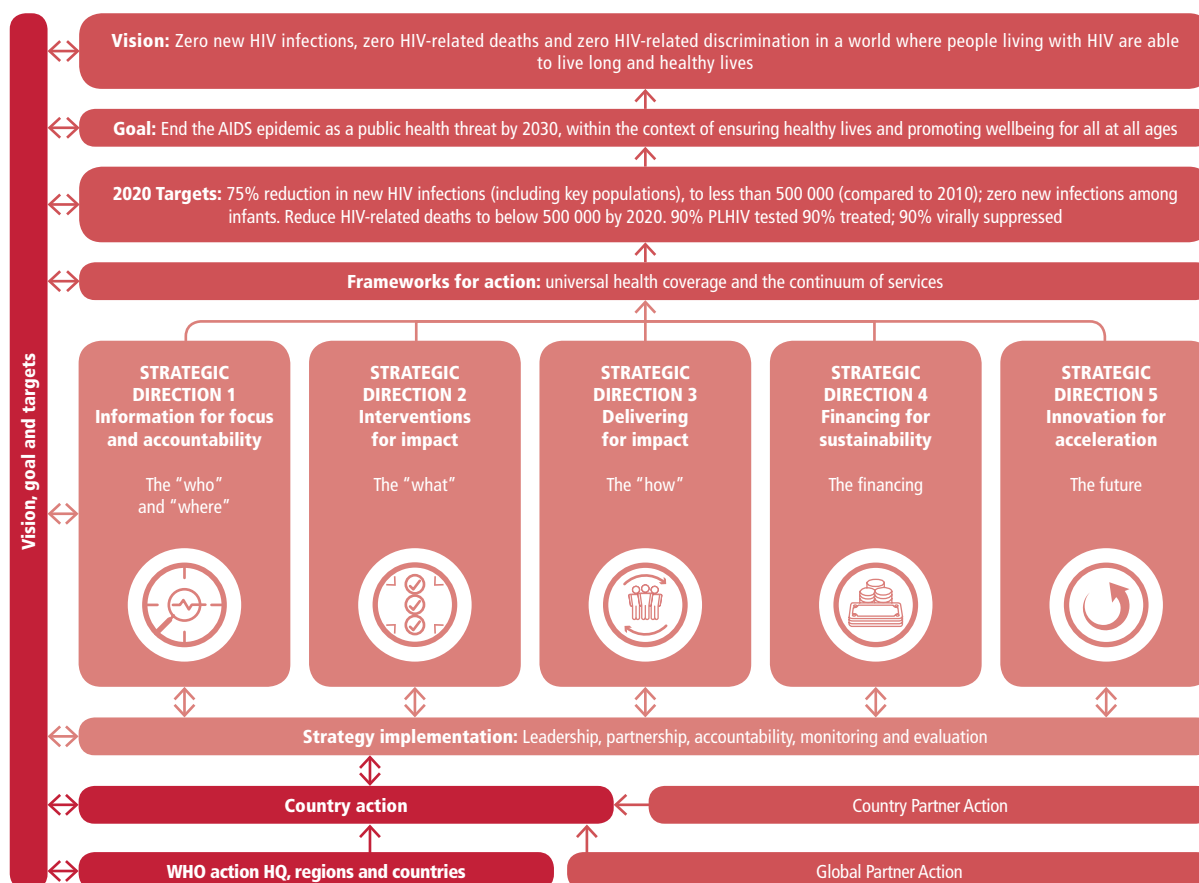
3.2 Five strategic areas for action

Reaching the 2020 targets requires accelerating the integrated public health approach that enabled the achievements of the past 15 years. The proposed WHO Global Health Sector Strategy on HIV 2016–2021 charts such a response.

Building on the progress and gaps discussed in this report, the WHO Global Health Sector Strategy on HIV 2016–2021 maps the way forward along five strategic directions, each answering a key question (Fig. 3.2).

- **Strategic direction 1 – What is the situation?** Using accurate strategic information to understand the epidemic, monitor interventions and their impact, guide improvements, develop national strategies and promote greater accountability. This will require more detailed and granular data as well as strengthened health information systems in countries.
- **Strategic direction 2 – What services should be delivered?** Defining the essential packages of high-impact interventions that need to be delivered along the cascade of HIV prevention, testing and treatment services and that should be considered for inclusion in national health benefit packages.
- **Strategic direction 3 – How can these services be delivered best?** Using the most effective methods and approaches for delivering the cascade of HIV services for different populations and locations to achieve equity, maximize impact and ensure quality.
- **Strategic direction 4 – How can the costs of delivering the package of services be covered?** Implementing sustainable funding models for HIV responses and reducing costs and other financial barriers so that people can access the services they need without incurring financial hardship.
- **Strategic direction 5 – How can the trajectory of the response be changed?** Innovating new technologies and ways of organizing and delivering services so that HIV responses can be accelerated and close the remaining gaps.

Fig. 3.2 The five strategic directions of the Global Health Sector Strategy on HIV 2016–2021



Source: Global Health Sector Strategies 2016–2021. Briefing note: 30.09.15 (2).

Most of the essential tools and interventions for reaching the 2020 and 2030 targets exist, and further innovations are

on the horizon. Using them to full effect, however, requires capacities and enabling factors that are unevenly available.

Box 3.1 The new HIV Strategy for the African Region

In order to accelerate HIV responses in the region, the WHO Regional Office for Africa is developing an HIV strategy specifically for the African Region. It will be based on the three global health sector strategies (for HIV, viral hepatitis and sexually transmitted infections) which WHO will present at the 69th World Health Assembly in 2016.

The new African strategy will guide efforts to meet the 2020 and 2030 targets and will be anchored in a set of core principles:

- an **integrated approach** is needed to ensure that HIV, STI and viral hepatitis services are integrated into overall health sector investments;
- **prevention and treatment** activities should be balanced and linked to take full advantage of their mutual synergies;
- the **affordability of HIV commodities and diagnostics** must be safeguarded, with WHO playing an important role in facilitating arrangements that can lead to price reductions;
- a focus on **key populations** is needed to ensure that the HIV response leaves no-one behind;
- the **human rights** dimension of HIV programmes should be strengthened, and there should be more explicit links to poverty and climate change in national HIV strategies; and
- the growing role of **private health care provision** needs to be taken into account.

The African HIV strategy will be aligned with the latest strategies of key partners, including the Global Fund, PEPFAR and UNAIDS, and it will focus on contributing to the achievement of the Sustainable Development Goals. Other regions are also developing HIV strategies or implementation plans.

3.2.1 Using strategic information for decisions and accountability

Strategic information systems should be capable of gathering and analysing high-quality, granular data for making decisions that focus and improve HIV interventions, for developing national strategies and for achieving greater accountability.

Collecting and analysing reliable data have been essential components of national HIV programmes. Countries have several major opportunities for strengthening strategic information as part of their HIV intervention packages:

- collecting more detailed and disaggregated subnational and key population data to focus services for greatest impact;
- conducting regular impact and programme reviews to focus and improve interventions; and
- strengthening routine patient and district reporting systems to manage chronic conditions.

New data collection, analysis and modelling approaches are available for determining modes of transmission, estimating the sizes of key populations, determining the locations and populations that require urgent action and identifying service gaps and deficiencies with greater accuracy (Box 3.2). Case-reporting and patient-tracking systems particularly need to be strengthened to enhance linkage to and retention in care and to improve HIV treatment outcomes. Greater community and stakeholder involvement in collecting and analysing the data can potentially improve their quality, relevance and use. The data are also vital for mobilizing greater strategic investment in HIV programmes and for strengthening accountability.

WHO recommends 10 indicators for global reporting and a menu of 50 national programme indicators to gauge the health sector response along the continuum of HIV services (Box 3.2).

Box 3.2 Improvements in collecting and using strategic information

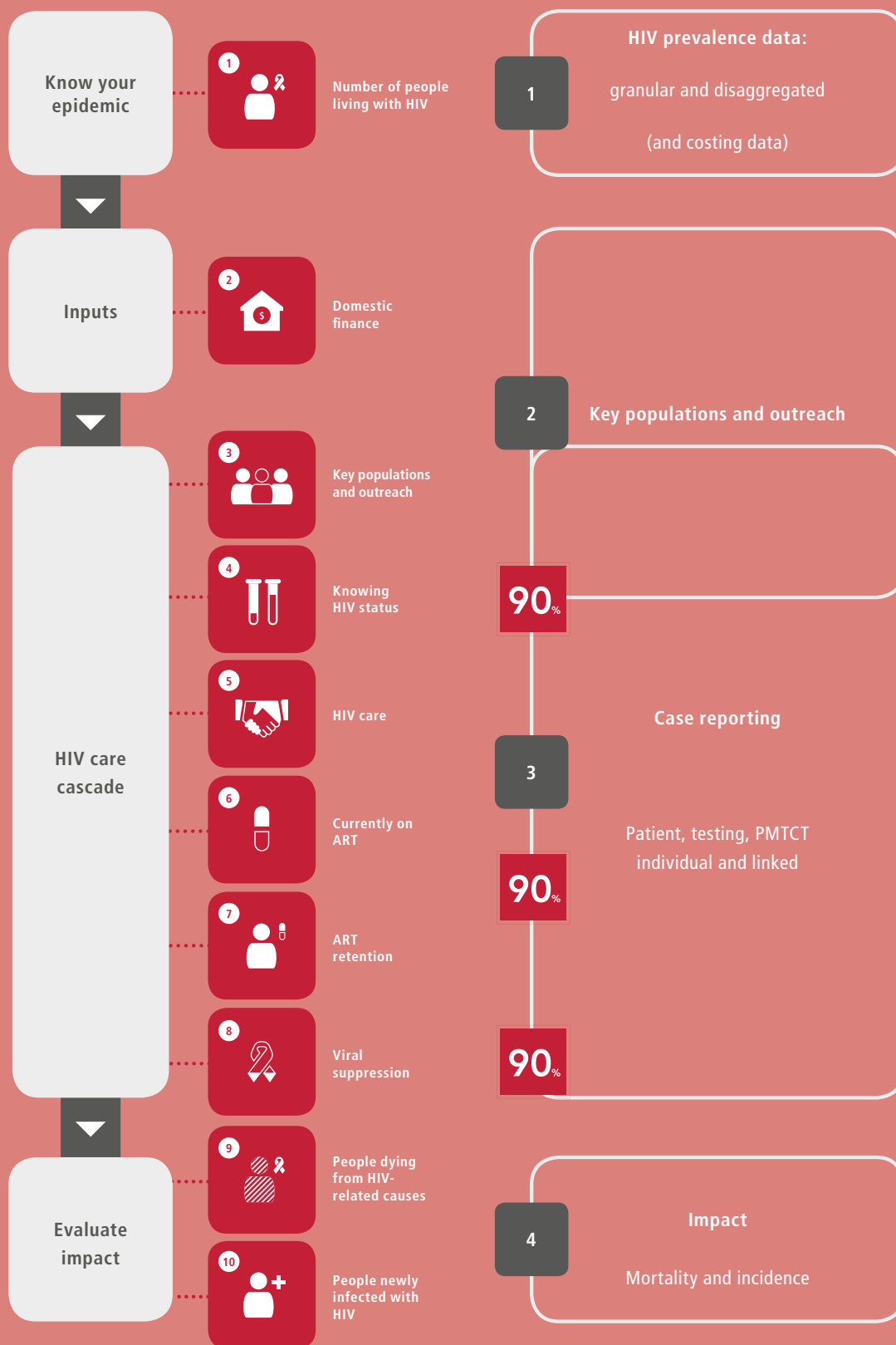
It is important to understand the progress, identify the gaps and decide on the most suitable actions for improvement at each stage of the service cascade. WHO's latest strategic information guidance (3) presents key improvements that can be made by:

- defining 10 global and 50 national health sector indicators as agreed among partners;
- organizing strategic information into a results or cascade framework;
- defining data needs to support disaggregated and granular HIV prevalence data, HIV prevention services for key populations, case reporting to improve the linking of individuals to services and a practical impact evaluation agenda to show changes in incidence and mortality; and
- strengthening accountability for the targets by defining the agreed set of indicators, together with support for data systems and analysis.

Key indicators for the continuum of HIV services (4) can be integrated into countries' national HIV monitoring and evaluation systems (Fig. 3.3). The use of standardized, internationally agreed indicators will help ensure that the data are comparable across countries, and involves the following steps for implementation.

1. **Consolidate and set priorities for indicators** for consistent global and national reporting.
2. **Identify data sources** and surveillance priorities to strengthen data.
3. **Plan the disaggregation of data** and build analytical capacity, including for feeding analysis back into programme decisions.
4. **Use data regularly for decisions** to improve the delivery of health sector services.
5. **Evaluate impact** using a practical, regular impact evaluation agenda to make necessary adjustments to a programme based on evidence.

Fig. 3.3 Ten global measurements for the HIV epidemic



3.2.2 Selecting the essential package of HIV services

Each country needs to select the essential and most suitable package of high-impact interventions along the cascade of HIV prevention, testing, treatment and chronic care services.

Countries need to decide on effective and suitable packages of HIV interventions that span the entire cascade of HIV services, as discussed in greater detail in Chapter 2. These packages have to ensure that people can access effective HIV prevention services, be tested for HIV and, depending on their diagnosis, be referred to appropriate HIV prevention services or enrolled in care. They must also ensure that people who test HIV-positive are initiated early on ART, are retained on or moved to effective treatment to achieve sustained viral suppression and can access chronic and palliative care, including managing coinfections and other comorbidities.

It is important to tailor the services to populations and locations where the greatest impact can be achieved, with priority given to evidence-informed interventions. The packages should reflect the fact that some services are most effective when deployed in combination with others.

Prevent people from becoming infected with HIV

The number of people newly infected with HIV needs to be cut decisively by 75% in the next five years.

Evidence-based prevention tools, such as male and female condoms, behaviour change interventions and universal precautions in health settings would remain the mainstay elements of an enhanced HIV prevention package. Packages that combine those tools with the strategic use of ARV medicines for prevention (including early ART, pre-exposure prophylaxis and post-exposure prophylaxis) and with comprehensive prevention services for populations that experience a high incidence of HIV infection (especially key populations) are likely to achieve the best results. Harm-reduction services remain especially underused. There is also scope for capitalizing further on the preventive power of voluntary medical male circumcision in countries with a high burden of HIV infection.

Countries should decide on the most strategic combinations of ARV medicines and other prevention approaches, based on their country context. Opportunities for prevention need to be exploited at each stage of the HIV service cascade to decisively reduce HIV incidence.

Despite strong progress, rates of mother-to-child transmission of HIV remain unacceptably high, in excess of 10%, in many countries. Wider implementation of option B+ (providing lifelong ART to all pregnant and breastfeeding women living with HIV regardless of CD4 count or WHO clinical stage) can reduce mother-to-child transmission rates to less than 5% at the end of the breastfeeding period. In addition, enabling pregnant

women with HIV to initiate and continue ART will further improve maternal health and reduce the mother-to-child transmission of HIV in future pregnancies. Lifelong ART for all pregnant and breastfeeding women living with HIV, early infant diagnosis and infant prophylaxis and treatment are critical elements for managing HIV infection among infants.

Diagnose more people living with HIV

Slightly more than half the people living with HIV have been diagnosed, which is considerably short of the target of 90% of people with HIV knowing their HIV status by 2020.

Countries can use a greater variety of effective HIV testing strategies and approaches, focusing on the populations, settings and locations in which HIV risk and transmission is highest while assuring the quality of testing (to ensure correct diagnosis) and adhering to ethical testing practices. New approaches, including self-testing and the use of lay testers, offer opportunities to rapidly expand the coverage, quality and yield of testing services. When resources are limited, testing should target the areas in which yields will be greatest while maintaining equity. All HIV testing services and approaches, including self-testing, should include effective methods for linking people quickly and efficiently to prevention, care and treatment services.

Reach and retain more people in treatment and care

About 40% of people living with HIV are currently receiving ART, much less than the 90% coverage target for 2020. Large proportions of people receiving ART drop out of care or do not achieve sustained viral suppression. The situation is especially poor for children living with HIV and for key populations.

Initiating ART for everyone living with HIV will require an unprecedented effort from countries and partners. Strategies to maximize treatment adherence and retention in care will be essential, as will the use of quality-assured and well tolerated ART regimens. As more asymptomatic people are treated with ARV medicines, viral load testing is increasingly important to assess treatment effectiveness and prevent the emergence of HIV drug resistance. HIV care will need to be integrated with other health care issues as people remain on treatment over the medium term.

Link or integrate services

The uptake, coverage and acceptability of HIV interventions can be improved by strategically integrating or linking them with other relevant health services (including for TB, viral hepatitis, sexually transmitted infections, noncommunicable diseases, broader sexual and reproductive health and drug dependence and harm reduction). Use of a chronic care model for HIV treatment and care offers opportunities for addressing broader health needs, especially

noncommunicable diseases. The appropriate opportunities and models of integration and linkage will depend on the

context and the health system and should be informed by operational research and implementation best practice.

3.2.3 Achieving equity and quality

Public health systems must be capable of delivering the package of HIV interventions and services efficiently, effectively and equitably to different populations and locations.

HIV responses succeed when the essential packages of HIV interventions are delivered to populations and locations in ways that achieve maximum impact, ensure quality and achieve equitable coverage and health outcomes.

This requires health systems with robust strategic information capacity, effective service delivery models, a sufficiently trained and capable workforce and reliable supply chains and quality assurance systems. These systems should be capable of productively harnessing the strengths and contributions of various partners, especially those in civil society. Supportive social, legal, policy and institutional environments and involvement of communities would encourage and enable people to access and use services and would promote equity and human rights.

Ensure that no one is left behind

Disparities persist in HIV responses, with the benefits often not reaching the most vulnerable populations and populations at higher risk.

HIV interventions and the continuum of HIV services need to be adapted for different populations and locations, to reach those most severely affected and to ensure that no one is left behind. Greater investment and new strategies are needed to reduce the vulnerability and HIV risks of girls and young women (especially in the countries with a high burden of HIV infection in the African Region), strengthen appropriate services for adolescents, reach more men and boys with testing and treatment services, ensure that key populations benefit equitably from HIV services and expand harm-reduction programmes for people who use drugs.

The strategic decentralization and linking of services can increase coverage, access and uptake. Decentralizing services can also strengthen community engagement. The appropriate use of decentralization depends on the epidemic characteristics and health system infrastructure, with greater levels of decentralization especially relevant for settings with a high burden of HIV infection, great distances and weak referral systems. Community-based models of service delivery can make HIV and other health services more accessible, acceptable and relevant to specific populations.

More has to be done to overturn laws and remove practices that marginalize and stigmatize populations, promote risk behaviour and block access to effective services. WHO guidelines, and implementation tools developed with partners, define essential packages of HIV interventions and service delivery models for different populations and

settings, including specific packages for adolescents, women and girls, people who use drugs, sex workers, men who have sex with men, transgender people and prisoners.

Bolster human resources for health

Improvements in the supply, distribution and quality of health workers in public health systems remain unmet priorities in many low- and middle-income countries.

In addition to strengthening the health-care workforce, countries need to review the roles and tasks of health workers and how they are deployed across communities. This is best achieved within a comprehensive national health workforce plan that addresses the needs of the overall health system, including the specific needs related to the cascade of HIV services. Such a plan should include strategies for improving the capabilities, quality and retention of the health-care workforce. More countries need to endorse and comply with the 2010 WHO Global Code of Practice on the International Recruitment of Health Personnel, which is aimed at redressing imbalances in the distribution of health-care workers globally. By the end of 2014, only 37 countries had taken steps to implement the Code (5).

Task-shifting and task-sharing approaches are expected to play an increasingly important role in expanding the capacity of health-care systems. Defining the core competencies of various cadres of health-care workers will help determine which tasks can be shifted and to what levels. Supportive mechanisms, including mentoring, supervision and appropriate remuneration, are needed to safeguard the quality of services. Continuing training is needed to ensure that health-care workers are up to date with national guidelines and protocols and that they have the skills necessary to deliver essential services.

Community organizations and networks play key roles in supporting formal health services, in delivering services to people who are not reached by state-run services, in strengthening accountability and in promoting equity and human rights. Structured support for these community resources, such as training, funding and retention support, would improve the quality and sustainability of community-based services and programmes.

Ensure the quality of interventions and a reliable supply of commodities

Ensuring the quality of interventions is a priority, to achieve the greatest impact, improve efficiency and avert significant risks.

Rapid expansion of programmes to improve coverage should neither compromise the quality of services nor contribute to inequities in access to services and health

outcomes. By monitoring the integrity of their HIV service cascade, countries can determine where barriers exist, outcomes are unsatisfactory and people are lost to follow-up so that remedial action can be taken.

Quality can be enhanced by ensuring that HIV commodities and testing and laboratory services adhere to national and international norms and standards, are continuously monitored and meet people's needs and preferences. Standardizing and regulating the quality of products is important to avoid waste and inefficiency and to ensure safe and effective use (6).

Building and maintaining reliable supply chains is vital for safeguarding the quality of HIV services. Risks related to fragmented or variable demand can be addressed by regularly updating country forecasts and supply plans, regionally aggregating forecasted needs and supply plans for pooled procurement and restocking regional distribution centres based on projected demand (7). Pooled procurement is especially important for smaller product segments, such as children's and second-line ARV medicines (8). An effective logistic management information system with regular monitoring of stock levels along the supply chain is essential (9).

3.2.4 Sustainable funding, reduced costs

HIV funding needs to increase rapidly to reach the 2020 targets and should be made sustainable beyond that deadline, as costs start to decline. Action is needed to ensure that HIV medicines, other commodities and services are affordable and that using them does not pose a financial risk to people.

The HIV response can be sustainably funded in various ways, including by:

- raising revenue to pay for HIV services and interventions, including through public and private domestic funding and from external sources, such as donor grants and private contributions;
- setting up mechanisms to pool funds across the health system and provide risk protection related to health-care needs, such as through health insurance schemes; and
- reducing the costs of HIV medicines, diagnostics and other commodities, achieving savings by boosting the efficiency of HIV services and reducing the duplication of underlying subsystems with other programmes and the wider health system, such as strategic information, human resources and procurement and supply management.

The national health funding system should address HIV along with all other national priority health needs, avoiding fragmented funding channels and aiming to achieve health equity.

The resources mobilized from all sources for HIV programmes in low- and middle-income countries rose to an estimated US\$ 21.7 billion in 2015. The rising trend

Create and sustain an enabling environment

HIV interventions are most effective when they occur in social, legal and policy environments that encourage and enable people to use the services. Laws, policies and practices should therefore reflect public health evidence and priorities, promote health equity and human rights and support national HIV responses. Barriers that block access to HIV and other health services for key populations should be removed or reformed. Interventions that address stigma and discrimination in the social, institutional and policy realms are vitally important (Box 2.9) (10). They include removing laws that sanction discrimination and intervening to discourage or prevent discriminatory practices, especially in the health and social sectors (11).

National HIV governing structures are important for strategic planning, promoting policy coherence, coordinating the roles and actions of different stakeholders and aligning the HIV response with broader health programmes. The leadership of elected officials, including at subnational levels, is essential for securing commitment and achieving coherence and coordination.

mainly resulted from greater domestic funding, which comprised more than half of global HIV investment in 2014. Nevertheless, HIV investment will need to grow to US\$ 31.1 billion in 2020 and then decline slightly to US\$ 28.5 billion in 2030 to control the epidemic in the long term.

Additional and new sources of funding are required not only to fund the sustainable scaling up of interventions and services but also to fill funding gaps resulting from shifting priorities among donors. Domestic public funding for HIV programmes in low- and middle-income countries needs to continue to increase, and countries should develop transitional funding plans to streamline this process.

Public domestic money is vital for funding essential and sustainable health services, including those for HIV. UNAIDS has set 2020 targets for domestic funding of HIV programmes, including 12% domestic funding for programmes in low-income countries, 45% for lower-middle-income countries and 95% for upper-middle-income countries. Most low-income and lower-middle-income countries will continue to rely on external and private-sector funding for their HIV services and interventions through 2020 and beyond.

Innovation in health system funding can continue at the global and country levels – as shown by the inspiring examples of special levies on airline tickets, mobile telephone use and income taxes (Box 3.3). Similar innovation is needed to generate the resources required for a sustained response. Irrespective of the source, increasing HIV funding needs to support broader efforts to increase investment in health overall and to minimize health inequities.

Box 3.3 Zimbabwe's AIDS levy

In the WHO African Region, domestic funding for HIV has increased significantly in countries as diverse as Chad, Kenya, South Africa, Togo and Zimbabwe. Zimbabwe successfully introduced an AIDS levy in 1999 to increase funding for HIV. The levy is a 3% surcharge on individual income tax and corporate tax. Administered by the National AIDS Council, the funds raised in this manner have risen from less than US\$ 6 million in 2009 to almost US\$ 39 million in 2014. Since 2006, the government has mandated that half the AIDS levy go toward the procurement of ARV medicines. The first of its kind in the African Region, the levy has become a model for similar initiatives, including ones in Uganda and Zambia. This funding innovation was the first of its kind in Africa and provides a model for similar initiatives in other countries (12), especially if used to fund a range of essential health services.

Affordable commodities and services

In a resource-constrained environment with competing development priorities, the scaling up of HIV services required by 2020 will require further cost-saving through reduced prices of key medicines and other commodities and increased efficiency in service delivery, along with a more rational allocation of resources.

Scaling up HIV services requires that countries successfully pursue – independently and in partnerships – strategies to further reduce the prices of HIV medicines, diagnostics and other commodities. Further relaxing certain licensing conditions, including limits on the production of key active pharmaceutical ingredients, would be of great benefit (13). Mechanisms such as the Medicines Patent Pool are important for brokering arrangements that can safeguard and increase generic competition and expand access to affordable HIV commodities (14).

Protecting people against financial risk

In many countries, the HIV response has led efforts to minimize out-of-pocket payments for health services. Nevertheless,

using essential health services can still financially ruin individuals and households.

Essential HIV interventions, across the continuum of HIV services, should be included in national health benefit packages and be provided free of charge. User fees result in inequities in access to services, undermine service outcomes and constitute unnecessary financial burdens on households (15). Supportive arrangements, such as decentralizing services or offering transport vouchers, would help to reduce the indirect costs of accessing services and improve service uptake and impact.

A robust and fair national health funding system would strengthen protection against financial risk. Public funding systems for health, funded primarily with revenue raised from general taxation and/or payroll taxes for compulsory health insurance, are the most equitable and efficient systems (16). Contributions should be based on people's ability to pay, while revenue is pooled to distribute the benefits equitably, including to the individuals who cannot afford to contribute to the system. There is a convincing case for integrating HIV into such schemes, as such countries as Brazil, Chile, Colombia, Mexico, Rwanda and Thailand have been doing (Box 3.4).

Box 3.4 Cutting expenses with community-based health insurance in Rwanda

Integrating HIV services into social insurance schemes is important for sustainability. Rwanda's community-based health insurance scheme, *mutuelles de santé*, has reduced out-of-pocket health spending by half and has increased the uptake of HIV services (17). The scheme involves paying a small annual premium (the state pays the premiums of the poorest 25% of the population). The scheme covers more than 85% of the population (the rest are covered mostly by private, military and civil service insurance schemes). Key services, such as HIV and TB care and malnutrition treatment, are provided free of user charges.

3.2.5 Innovations for acceleration and impact

Achieving the HIV targets set for 2020 and 2030 will require new HIV technologies and service delivery approaches and new ways of adapting existing tools for different populations, settings or purposes.

The HIV targets set for 2020 and 2030 are unlikely to be achieved if countries rely solely on existing HIV knowledge, technologies and service delivery approaches. Ongoing innovation is needed.

A wide array of improved or new technologies could boost the acceptability, uptake and impact of HIV interventions (see Chapter 2). They include longer-acting injectable ARV medicines for PrEP, using new designs and materials in male and female condoms, devices that would simplify and improve the safety of medical male circumcision, simplified point-of-care HIV diagnostics, improved ARV medicine formulations for children and more robust, durable and affordable fixed-dose combination ART regimens. Innovation in collecting HIV data and delivering HIV services is very important.

Innovation extends beyond developing new technologies and approaches and includes adapting existing tools for different populations, settings or purposes. For example, task-shifting was pioneered in countries with a high burden of HIV infection in southern Africa but has been

retooled for use in eastern Europe and Asia. Such sharing and adaptation of knowledge can help countries to leapfrog their HIV responses, especially for enabling HIV programmes to meet new challenges, expand their reach and impact and enhance equity.

Operational research is vital to guide HIV service improvements to ensure that investment is optimized. WHO supports HIV research in four main areas: building the capacity of health research systems; convening partners around setting priorities for research; setting norms and standards for good research practice; and facilitating the translation of evidence into affordable health technologies and evidence-informed policy. WHO will continue to work with research and development partners to ensure that essential new HIV technologies are speedily available and affordable to countries.

3.3 Conclusion

We have arrived at a critical juncture. Looking back over the past 15 years, we see the remarkable progress of the health sector response to HIV, as the world reacted in ways that defied most expectations. Looking ahead, we see challenges as daunting as those that confronted communities and governments at the turn of the 21st century.

The difference today is the wealth of experience and lessons learned during the past 15 years, the array of powerful tools and proven methods that exist and the evident success of so many key innovations – much of it in the African Region.

The next five years arguably are the most challenging period yet for the global HIV response. Service coverage

has to expand further, data need to be used for more strategically focused interventions and the quality of these interventions must be safeguarded. All this has to be achieved on a massive scale.

If this acceleration does not happen, the number of people newly infected with HIV is likely to rise again and the costs of treatment will keep increasing far into the future. We will not have created a sustainable global response.

But if the acceleration does happen, the world will have forged a sustainable path to ending AIDS within this generation and to help achieve the aims and spirit of the Sustainable Development Goals.

EXPLANATORY NOTES

WHO, UNICEF and UNAIDS collected most of the health sector response data presented in this report that were submitted by countries through the joint Global AIDS Response Progress Reporting and health sector reporting processes (1), unless stated otherwise. Country data were submitted based on guidance to national AIDS programmes and partners on the use of core indicators for measuring and reporting on national HIV responses. Countries submitted data between March and April 2015, using the joint online reporting system. A data validation process followed the country submission. Country-level data will be published online at the WHO website (2).

The country offices of WHO, UNICEF and UNAIDS worked jointly with national counterparts and partner agencies to validate data in a single collaborative consultation process. When discrepancies or inconsistencies were identified in the reported data, national authorities were asked to clarify or resolve them.

The health sector response data for HIV and the WHO/UNAIDS epidemiological estimates are updated annually, including for previous years. The data presented in this report therefore supersede those from all previous reports.

COUNTRY POLICIES AND PRACTICES

WHO maintains an internal database on HIV-related policies and practices in countries. The database has information provided by countries through the Global AIDS Response Progress Reporting and with additional information provided by staff members of WHO regional and country offices. The sources of information are documented for each information element.

The database currently focuses on information for 58 focus countries.¹ These countries have been identified based on an existing global set of priority countries for various initiatives (especially the 38 high-impact countries of the UNAIDS United Budget, Results and Accountability Framework (3) and the 22 priority countries for the Global Plan towards the elimination of new HIV infections among children and keeping their mothers alive (4) as well as additional countries identified by WHO regional offices as having strategic importance. WHO staff members in countries regularly validate and update the information in the database.

NUMBER OF PEOPLE 15 YEARS AND OLDER WHO RECEIVED HIV TESTING AND COUNSELLING AND KNOW THE RESULTS

The number of adults who received HIV testing and counselling in the past 12 months and know the results in a given country is collected from routine reports from all service points, including

voluntary counselling and testing sites, clinics, hospitals and nongovernmental organization outreach points. The data are compiled at the district or local level and then finally at the national level. A total of 105 countries reported data for 2014; data from 24 countries were imputed from the latest available year. These data are not corrected for the fraction of people who have been tested more than once in the year.

NUMBER OF PEOPLE RECEIVING ANTIRETROVIRAL THERAPY

For December 2014, 135 of the 144 low- and middle-income countries had provided data on access to antiretroviral therapy (ART). These 135 countries accounted for 96% of the people receiving treatment at the end of 2014 in low- and middle-income countries. An additional six countries (Gambia, Iran (Islamic Republic of), Myanmar, Namibia, Peru and Thailand) submitted data for cut-off points between September and November 2014. Together, these 141 countries represented more than 99% of the total estimated number of people receiving ART in low- and middle-income countries at the end of 2014. Only three countries, all with relatively small HIV epidemics, did not report these data for 2014. An abbreviated process was applied to obtain mid-2015 results.

The reported data on people currently receiving ART in low-, middle- and high-income countries were compiled from the most recent reports provided by health ministries or other reliable sources in the countries, such as bilateral partners, foundations and nongovernmental organizations that are major providers of treatment services. WHO, UNICEF and UNAIDS work with countries to obtain as many facility-specific data as possible on the numbers of people receiving treatment.

Reporting the number of people receiving ART involves some uncertainty for countries that have not yet established regular reporting systems for capturing accurate data on people who initiate treatment for the first time, people who discontinue treatment, people who are lost to follow-up and people who die.

Uncertainty may also arise because of difficulty in measuring the extent of ART provided in the for-profit and not-for-profit private sectors. Some people receive treatment through nongovernmental organizations and/or private clinics that do not report through official channels in some countries. Private companies may have programmes to support the provision of ART to workers with advanced HIV disease but do not necessarily report these data to the public health authorities. When available, data from the private sector have been included.

In addition, the report presents the most recent available data from high-income countries.

¹ The 2014–2015 focus countries are: Angola, Bolivia (Plurinational State of), Botswana, Brazil, Burundi, Cambodia, Cameroon, Central African Republic, Chad, China, Côte d'Ivoire, Democratic Republic of the Congo, Djibouti, Dominican Republic, Ecuador, El Salvador, Ethiopia, Ghana, Guatemala, Haiti, Honduras, India, Indonesia, Iran (Islamic Republic of), Jamaica, Kazakhstan, Kenya, Kyrgyzstan, Lesotho, Libya, Malawi, Morocco, Mozambique, Myanmar, Namibia, Nepal, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Russian Federation, Rwanda, Somalia, South Africa, South Sudan, Sudan, Swaziland, Tajikistan, Thailand, Uganda, Ukraine, United Republic of Tanzania, Uzbekistan, Viet Nam, Yemen, Zambia and Zimbabwe.

Estimating treatment eligibility and coverage

Standard methods were used for estimating the size and course of the HIV epidemic, number of people living with HIV, number of people newly infected with HIV and mortality attributable to AIDS (5,6). Under the 2013 WHO consolidated ARV guidelines (7), about 80% of all people living with HIV would be eligible for treatment in 2014. In September 2015, WHO launched early-release ARV guidelines (8) which recommend that everyone living with HIV should start ART as soon after diagnosis as possible. Countries are currently at various stages of adopting the global ART eligibility recommendations. For reasons of comparability across countries and over time in the context of changing recommendations, this report relates the number of people receiving ART to the overall number of people living with HIV receiving ART. The ranges around the numbers of people living with HIV who were receiving ART are based on the uncertainty bounds around the estimates of the numbers of people living with HIV (9).

The uncertainty bounds reflect the certainty associated with each of the estimates: the wider the bounds, the greater the uncertainty surrounding an estimate. The extent of uncertainty depends mainly on the type of epidemic, the quality, coverage and consistency of a country's surveillance system and, in generalized epidemics, whether or not a population-based survey with HIV testing was conducted.

PREVENTION OF MOTHER-TO-CHILD TRANSMISSION

Number of pregnant women living with HIV receiving ARV medicine for preventing mother-to-child transmission

The number of pregnant women living with HIV and who are receiving ARV medicine for preventing mother-to-child transmission is based on national programme data that are aggregated from facilities or other service delivery sites, as reported by countries. In a few countries for which national data are not available, the value is estimated through a special survey or sentinel sites to assess the coverage of ARV medicines among pregnant women living with HIV, and this percentage has been applied to the estimated number of pregnant women living with HIV to derive an estimate for the number of pregnant women living with HIV receiving ARV medicine for preventing mother-to-child transmission.

A total of 121 countries reported these data for 2014; together, they accounted for nearly all of the estimated pregnant women living with HIV in low- and middle-income countries. This report focuses on the 21 priority countries in the African Region for the Global Plan towards the elimination of new HIV infections among children and keeping their mothers alive (4).

The estimated coverage of ARV medicine for preventing mother-to-child transmission of HIV includes only the most effective regimens (ART and combination regimens) and excludes single-dose nevirapine, which WHO no longer recommends.

Estimating the number of pregnant women living with HIV (who are all eligible for ARV medicine for preventing mother-to-child transmission)

The number of pregnant women living with HIV who are eligible for ARV medicine for preventing the mother-to-child transmission of HIV is estimated using standardized statistical modelling. This is based on UNAIDS/WHO methods that consider various epidemic and demographic parameters, such as the HIV prevalence among women of reproductive age and the effect of HIV on fertility (5). The uncertainty ranges for these estimates are generated based on these parameters. Regular scientific updates have been provided on these tools (10).

Coverage of pregnant women living with HIV receiving ARV medicine for preventing mother-to-child transmission

The coverage of ARV medicine for preventing the mother-to-child transmission of HIV is calculated by dividing the number of pregnant women living with HIV who received ARV medicine for preventing mother-to-child transmission of HIV in 2014 by the estimated number of pregnant women living with HIV in a given country.

The ranges around the levels of coverage are based on the uncertainty ranges around the estimates of pregnant women living with HIV.

CLASSIFICATION OF COUNTRIES

Classification by income

Unless stated otherwise, all data analysis in this report is based on data from the 144 countries the World Bank classified as low- and middle-income countries as of July 2011 (11), the classification valid at the time when the global targets were set in the United Nations Political Declaration on HIV and AIDS. The economies are classified as low, middle or high income according to the gross national income per capita, calculated using the World Bank Atlas method (to reduce the effect of exchange-rate fluctuation). The groups (as of 1 July 2014) are:

- low-income, US\$ 1045 or less;
- lower-middle income, US\$ 1046 to US\$ 4125, and upper-middle income, US\$ 4126 to US\$ 12 745; and
- high-income, US\$ 12 746 or more.

Classification by HIV epidemic level

HIV epidemics are categorized as low-level, concentrated and generalized based on the following principles and numerical proxies.

Low-level

Principle. Although HIV infection may have existed for many years, it has never spread to significant levels in any subpopulation. Recorded infection is largely confined to

individuals with high-risk behaviour, such as sex workers, people who inject drugs and men who have sex with men. This epidemic state suggests that networks of risk are rather diffuse (with low levels of partner exchange or sharing of drug-injecting equipment) or that the virus has been introduced very recently.

Concentrated

Principle. HIV has spread rapidly in a defined subpopulation but is not well established in the general population. This epidemic state suggests active networks of risk within the subpopulation. The frequency and nature of links between highly infected subpopulations and the general population determines the future course of the epidemic.

Generalized

Principle. In generalized epidemics, HIV is firmly established in the general population. Although populations at higher risk may continue to contribute disproportionately to the transmission of HIV, sexual networking in the general

population is sufficient to sustain an epidemic independent of populations at higher risk of infection and transmission.

Classification of Member States by WHO region

This report presents data on low- and middle-income countries classified by WHO region. WHO has 194 Member States² grouped in six regions, and 144 of these are low- and middle-income countries: the WHO African Region (n = 45); WHO Region of the Americas (n = 29); WHO Eastern Mediterranean Region (n = 16); WHO European Region (n = 22); WHO South-East Asia Region (n = 11); and WHO Western Pacific Region (n = 21). There are 50 high-income countries.

ROUNDING OF NUMBERS

Throughout the report, analyses performed on health sector response data and UNAIDS/WHO estimates are based on unrounded data. However, for presentation purposes, most numbers have been rounded to facilitate interpretation of the data. As a result, in some cases percentages and numbers may not add up to the totals shown in tables because of rounding.

² The complete list of WHO Member states is available online at <http://www.who.int/countries/en/>.

REFERENCES

CHAPTER 1

1. Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2011 (http://www.unaids.org/sites/default/files/media_asset/20110609_JC2137_Global-Plan-Elimination-HIV-Children_en_1.pdf, accessed 31 October 2015).
2. WHO validates elimination of mother-to-child transmission of HIV and syphilis in Cuba. Geneva: World Health Organization; 2015 (<http://www.who.int/mediacentre/news/releases/2015/mtct-hiv-cuba/en>, accessed 31 October 2015).
3. Kasedde S, Luo C, McClure C, Chandan U. Reducing HIV and AIDS in adolescents: opportunities and challenges. *Curr HIV/AIDS Rep.* 2013;10:159–68.
4. Global health estimates 2013 summary tables: DALYs, YLLs and YLDs by cause, age and sex by WHO regional group and World Bank income classification, 2000–2012 (provisional estimates). Geneva: World Health Organization; 2014.
5. Statistics South Africa. Mid-year population estimates 2014. Pretoria: Government of South Africa; 2015 (Statistical Release P0302; <http://beta2.statssa.gov.za/publications/P0302/P03022014.pdf>, accessed 31 October 2015).
6. Mid-term analytical review of performance of the health sector strategic plan III, 2009–2015. Dar es Salaam: Ministry of Health; 2013.
7. Global tuberculosis report 2015. Geneva: World Health Organization; 2015 (http://www.who.int/tb/publications/global_report/en, accessed 31 October 2015).
8. Ford N, Shubber Z, Meintjes G, Grinsztejn B, Eholie S, Mills E et al. Causes of hospitalization among people living with HIV: a global systematic review and meta-analysis. *Lancet HIV.* 2015;2:e438–44.
9. The aids2031 Consortium. AIDS: Taking a long-term view. Upper Saddle River (NJ): FT Press; 2011.
10. Progress on global access to HIV antiretroviral therapy: a report on “3 by 5” and beyond. Geneva: World Health Organization; 2006 (<http://www.who.int/hiv/pub/2006progressreport/en>, accessed 31 October 2015).
11. Kiweewa FM, Wabwire D, Nakibuuka J, Mubiru M, Bagenda D, Musoke P et al. Noninferiority of a task-shifting HIV care and treatment model using peer counselors and nurses among Ugandan women initiated on ART: evidence from a randomized trial. *J Acquir Immune Defic Syndr.* 2013;63:e125–32.
12. Selke HM, Kimaiyo S, Sidle JE, Vedanthan R, Tierney WM, Shen C et al. Task-shifting of antiretroviral delivery from health care workers to persons living with HIV/AIDS: clinical outcomes of a community-based program in Kenya. *J Acquir Immune Defic Syndr.* 2010;55:483–90.
13. Coutinho A. The AIDS Support Organization (TASO). 2006 HIV/AIDS Implementers’ Meeting, 12–15 June 2006, Durban, South Africa.
14. Igulot P, Nanongo D, Odongo D. Accelerated response to HIV and AIDS through private-public capacity building partnerships: the experience of TASO Uganda. 2008 HIV/AIDS Implementers’ Meeting; 3–7 June 2008; Kampala, Uganda.
15. Scaling up antiretroviral therapy in resource-limited settings: guidelines for a public health approach. Geneva: World Health Organization; 2002 (http://www.who.int/hiv/pub/prev_care/en/ScalingUp_E.pdf, accessed 31 October 2015).
16. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. Geneva: World Health Organization; 2015 (<http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en>, accessed 31 October 2015).
17. Beck EJ, Passarelli C, Lui I, Guichard AC, Simao M, De Lay P et al. Scaling-up the use of generic antiretrovirals in resource-limited countries: generic drugs for health. *Antivir Ther.* 2014;19(Suppl. 3):117–23.
18. Pascual F. Intellectual property rights, market competition and access to affordable antiretrovirals. *Antivir Ther.* 2014;19(Suppl 3):57–67.
19. Schwartländer B, Stover J, Walker N, Bollinger L, Gutierrez JP, McGreevey W et al. Resource needs for HIV/AIDS. *Science.* 2001;292:2434–36.
20. PEPFAR funding: fact sheet. Washington (DC): United States President’s Emergency Plan for AIDS Relief; 2015 (<http://www.pepfar.gov/documents/organization/189671.pdf>, accessed 31 October 2015).

21. How AIDS changed everything. MDG 6: 15 years, 15 lessons of hope from the AIDS response. Geneva: UNAIDS; 2015 (http://www.unaids.org/sites/default/files/media_asset/MDG6Report_en.pdf, accessed 31 October 2015).
22. Meeting the investment challenge, tipping the dependency balance. Geneva: UNAIDS; 2012 (http://www.unaids.org/sites/default/files/media_asset/20120718_investmentchallengesupplement_en_1.pdf, accessed 31 October 2015).
23. Lievens T, Kioko U. Sustainable financing for HIV/AIDS in Kenya. Oxford: Oxford Policy Management; 2012.
24. Yates R. Universal health care and the removal of user fees. *Lancet*. 2009;373:2078–81.
25. FDA-approved HIV medicines. Rockville (MD): AIDSinfo; 2015 (<https://aidsinfo.nih.gov/education-materials/fact-sheets/21/58/fda-approved-hiv-medicines>, accessed 31 October 2015).
26. Collins S, Horn T. The antiretroviral pipeline. New York: Treatment Action Group; 2015 (<http://www.pipelinereport.org/2015/arv>, accessed 31 October 2015).
27. Kredo T, Ford N, Adeniyi FB, Garner P. Decentralising HIV treatment in middle- and low-income countries. *Cochrane Database Syst Rev*. 2013;6:CD009987.
28. Ripin DJ, Jamieson D, Meyers A, Warty U, Dain M, Khamsi C. Antiretroviral procurement and supply chain management. *Antivir Ther*. 2014;19(Suppl 3):79–89.
29. Understanding Fast-Track: accelerating action to end the AIDS epidemic by 2030. Geneva: UNAIDS; 2015 (http://www.unaids.org/sites/default/files/media_asset/201506_JC2743_Understanding_FastTrack_en.pdf, accessed 31 October 2015).
30. Global Health Sector Strategy on HIV 2016–2021: draft for consultation. Geneva: World Health Organization; 2015 (<http://www.who.int/hiv/proposed-hiv-strategy2016-2021/en>, accessed 31 October 2015).
31. Consolidated guidelines on HIV testing services: the 5Cs: consent, confidentiality, counselling, correct results and connection. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/179870/1/9789241508926_eng.pdf?ua=1, accessed 31 October 2015).
32. Consolidated guidelines on HIV prevention, diagnosis, treatment and care for key populations. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/128048/1/9789241507431_eng.pdf?ua=1&ua=1, accessed 31 October 2015).
33. Consolidated strategic information guidelines for HIV in the health sector. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/164716/1/9789241508759_eng.pdf?ua=1&ua=1, accessed 31 October 2015).

CHAPTER 2

1. Bello G, Simwaka B, Ndhlovu T, Salaniponi F, Hallett TB. Evidence for changes in behaviour leading to reductions in HIV prevalence in urban Malawi. *Sex Transm Infect*. 2011;87:296–300.
2. Hallett TB, Aberle-Grasse J, Bello G, Boulos LM, Cayemittes MP, Cheluget B et al. Declines in HIV prevalence can be associated with changing sexual behaviour in Uganda, urban Kenya, Zimbabwe, and urban Haiti. *Sex Transm Infect*. 2006;82(Suppl. 1):i1–8.
3. Fylkesnes K, Musonda RM, Sichone M, Ndhlovu Z, Tembo F, Monze M. Declining HIV prevalence and risk behaviours in Zambia: evidence from surveillance and population-based surveys. *AIDS*. 2001;15:907–16.
4. Halperin DT, Mugurungi O, Hallett TB, Muchini B, Campbell B, Magure T et al. A surprising prevention success: Why did the HIV epidemic decline in Zimbabwe? *PLoS Med*. 2011;8:e1000414.
5. Johnson LF, Hallett TB, Rehle TM, Dorrington RE. The effect of changes in condom usage and antiretroviral treatment coverage on human immunodeficiency virus incidence in South Africa: a model-based analysis. *J R Soc Interface*. 2012;9:1544–54.
6. Hayes R, Weiss H. Understanding HIV epidemic trends in Africa. *Science*. 2006;311:620–1.
7. DHS STATcompiler [online database]. Rockville (MD): ICF International; 2015 (<http://legacy.statcompiler.com>, accessed 31 October 2015).
8. How AIDS changed everything. MDG 6: 15 years, 15 lessons of hope from the AIDS response. Geneva: UNAIDS; 2015 (http://www.unaids.org/sites/default/files/media_asset/MDG6Report_en.pdf, accessed 31 October 2015).
9. Centers for Disease Control and Prevention (CDC). HIV and syphilis infection among men who have sex with men – Bangkok, Thailand, 2005–2011. *MMWR Morb Mortal Wkly Rep*. 2013;62:518–20.

10. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2013. Sydney: Kirby Institute; 2013.
11. HIV among gay, bisexual, and other men who have sex with men. Fact sheet. Atlanta: Centers for Disease Control and Prevention; 2013 (<http://www.cdc.gov/hiv/risk/gender/msm/facts/index.html>, accessed 31 October 2015).
12. UNFPA, WHO, UNAIDS. Position statement on condoms and the prevention of HIV, other sexually transmitted infections and unintended pregnancy. Geneva: UNAIDS; 2015 (http://www.unaids.org/en/resources/presscentre/featurestories/2015/july/20150702_condoms_prevention, accessed 31 October 2015).
13. Global report: UNAIDS report on the global AIDS epidemic 2013. Geneva: UNAIDS; 2013 (http://www.unaids.org/sites/default/files/media_asset/UNAIDS_Global_Report_2013_en_1.pdf, accessed 31 October 2015).
14. Progress report of the implementation of the Global Strategy for Prevention and Control of Sexually Transmitted Infections: 2006–2015. Geneva: World Health Organization; 2015.
15. Bailey RC, Moses S, Parker CB, Agot K, Maclean I, Krieger JN et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomized controlled trial. *Lancet*. 2007;369:643–56.
16. Gray RH, Kigozi G, Serwadda D, Makumbi F, Watya S, Nalugoda F et al. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomized trial. *Lancet*. 2007;369:657–66.
17. Auvert B, Taljaard D, Lagarde E, Sobngwi-Tambekou J, Sitta R, Puren A. Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: the ANRS 1265 trial. *PLoS Med*. 2005;2:e298.
18. New data on male circumcision and HIV prevention: policy and programme implications: conclusions and recommendations. WHO/UNAIDS Technical consultation on male circumcision and HIV prevention: research implications for policy and programming, Montreux, Switzerland, 6–8 March 2007.
19. Njeuhmeli E, Forsythe S, Reed J, Opuni M, Bollinger L, Heard N et al. Voluntary medical male circumcision: modeling the impact and cost of expanding male circumcision for HIV prevention in eastern and southern Africa. *PLoS Med*. 2011;8:e1001132.
20. Tobian AA, Serwadda D, Quinn TC, Kigozi G, Gravitt PE, Laeyendecker O et al. Male circumcision for the prevention of HSV-2 and HPV infections and syphilis. *N Engl J Med*. 2009;360:1298–309.
21. WHO progress brief: voluntary medical male circumcision for HIV prevention in priority countries of east and southern Africa. Geneva: World Health Organization; 2014 (<http://www.who.int/hiv/topics/malecircumcision/male-circumcision-info-2014/en>, accessed 31 October 2015).
22. Ashengo TA, Hatzold K, Mahler H, Rock A, Kanagat N, Magalona S, Curran K et al. Voluntary medical male circumcision (VMMC) in Tanzania and Zimbabwe: service delivery intensity and modality and their influence on the age of clients. *PLoS One*. 2014;9:e83642.
23. Progress in scaling up voluntary medical male circumcision for HIV prevention in east and southern Africa, January–December 2012. Brazzaville: WHO Regional Office for Africa; 2013 (<http://www.afro.who.int/en/clusters-a-programmes/dpc/acquired-immune-deficiency-syndrome/features/3949-progress-in-scaling-up-voluntary-medical-male-circumcision-for-hiv-prevention-in-east-and-southern-africa-january-december-2012.html>, accessed 31 October 2015).
24. Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2011 (http://www.unaids.org/sites/default/files/media_asset/20110609_JC2137_Global-Plan-Elimination-HIV-Children_en_1.pdf, accessed 31 October 2015).
25. Priority countries. New York: Interagency Task Team on the Prevention and Treatment of HIV Infection in Pregnant Women, Mothers and Children; 2015 (<http://www.emtct-iatt.org/priority-countries>, accessed 31 October 2015).
26. Newman L, Kamb M, Hawkes S, Gomez G, Say L, Seuc A et al. Global estimates of syphilis in pregnancy and associated adverse outcomes: analysis of multinational antenatal surveillance data. *PLoS Med*. 2013;10:e1001396.
27. The global elimination of congenital syphilis: rationale and strategy for action. Geneva: World Health Organization; 2007 (<http://www.who.int/reproductivehealth/publications/rtis/9789241595858/en>, accessed 31 October 2015).
28. Progress report of the implementation of the Global Strategy for Prevention and Control of Sexually Transmitted Infections: 2006–2015. Document for the World Health Assembly. Geneva: World Health Organization; 2015 (<http://www.who.int/reproductivehealth/publications/rtis/progress-report-stis-strategy/en>, accessed 31 October 2015).
29. Report on global sexually transmitted infection surveillance 2013. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/112922/1/9789241507400_eng.pdf, accessed 31 October 2015).

30. Elimination of mother-to-child transmission (EMTCT) of HIV and syphilis: global guidance on criteria and processes for validation. Geneva: World Health Organization; 2014 (<http://www.who.int/reproductivehealth/publications/rtis/9789241505888/en>, accessed 31 October 2015).
31. Drake AL, Wagner A, Richardson B, John-Stewart G. Incident HIV during pregnancy and postpartum and risk of mother-to-child HIV transmission: a systematic review and meta-analysis. *PLoS Med.* 2014;11:e1001608.
32. Bucagu M, Muganda J. Implementing primary health care-based PMTCT interventions: operational perspectives from Muhima cohort analysis (Rwanda). *Pan-Afr Med J.* 2014;18:59.
33. Jean-Baptiste R, Boucar M, Nicholas D, Nzeyimana B. Collaborative quality improvement in PMTCT in Rwanda. 2006 HIV/AIDS Implementers Meeting of the President's Emergency Plan for AIDS Relief, 12–15 June 2006, Durban, South Africa.
34. Irakoze AA, Nsanzimana S, Jennifer M, Remera E, Karangwa C, Tsague E et al. Family-centered approach in PMTCT program, Rwanda. Rwanda Biomedical Center. 2007–2011. Children and HIV: Closing the Gap – Ending Vertical Transmission through Community Action, a pre-conference symposium at AIDS 2012, 20–21 July 2012, Washington, DC (<http://www.ccaba.org/wp-content/uploads/Irakoze-Ange-Anitha-Family-Centered-Approach-in-PMTCT-Program-Rwanda-2005-2011.pdf>, accessed 31 October 2015).
35. Binagwaho A, Pegurri E, Drobac PC, Mugwaneza P, Stulac SN, Wagner CM et al. Prevention of mother-to-child transmission of HIV: cost-effectiveness of antiretroviral regimens and feeding options in Rwanda. *PLoS ONE.* 2013;8:e54180.
36. Rwanda: Global AIDS Response Progress Report (GARPR). Kigali: Ministry of Health, Republic of Rwanda; 2014 (http://www.unaids.org/sites/default/files/en/dataanalysis/knownyourresponse/countryprogressreports/2014countries/RWA_narrative_report_2014.pdf, accessed 31 October 2015).
37. Kim MH, Ahmed S, Hosseinipour MC, Giordano TP, Chiao EY, Yu X et al. Implementation and operational research: the impact of option B+ on the antenatal PMTCT cascade in Lilongwe, Malawi. *J Acquir Immune Defic Syndr.* 2015;68:e77–83.
38. Centers for Disease Control and Prevention (CDC). Impact of an innovative approach to prevent mother-to-child transmission of HIV – Malawi, July 2011–September 2012. *MMWR Morb Mortal Wkly Rep.* 2013;62:148–51.
39. Fasawe O, Avila C, Shaffer N, Schouten E, Chimbwandira F, Hoos D et al. Cost-effectiveness analysis of option B+ for HIV prevention and treatment of mothers and children in Malawi. *PLoS One.* 2013;8:e57778.
40. Nelson LJ, Beusenberg M, Habiyambere V, Shaffer N, Vitoria MA, Montero RG et al. Adoption of national recommendations related to use of antiretroviral therapy before and shortly following the launch of the 2013 WHO consolidated guidelines. *AIDS.* 2014;28(Suppl. 2):S217–24.
41. Delvaux T, Elul B, Ndagije F, Munyana E, Roberfroid D, Asimwe A. Determinants of non-adherence to a single-dose nevirapine regimen for the prevention of mother-to-child HIV transmission in Rwanda. *J Acquir Immune Defic Syndr.* 2009;50:223–230.
42. Ngarina M, Popenoe R, Kilewo C, Biberfeld G, Ekstrom AM. Reasons for poor adherence to antiretroviral therapy postnatally in HIV-1 infected women treated for their own health: experiences from the Mitra Plus study in Tanzania. *BMC Public Health.* 2013;13:450.
43. Nachega JB, Uthman OA, Anderson J, Peltzer K, Wampold S, Cotton MF et al. Adherence to antiretroviral therapy during and after pregnancy in low-income, middle-income, and high-income countries: a systematic review and meta-analysis. *AIDS.* 2012;26:2039–52.
44. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. Geneva: World Health Organization; 2013 (<http://www.who.int/hiv/pub/guidelines/arv2013/en>, accessed 31 October 2015).
45. Consolidated guidelines on HIV testing services: the 5Cs: consent, confidentiality, counselling, correct results and connection. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/179870/1/9789241508926_eng.pdf?ua=1, accessed 31 October 2015).
46. Ngarina M, Popenoe R, Kilewo C, Biberfeld G, Ekstrom AM. Reasons for poor adherence to antiretroviral therapy postnatally in HIV-1 infected women treated for their own health: experiences from the Mitra Plus study in Tanzania. *BMC Public Health.* 2013;13:450.
47. Nachega JB, Uthman OA, Anderson J, Peltzer K, Wampold S, Cotton MF et al. Adherence to antiretroviral therapy during and after pregnancy in low-income, middle-income, and high-income countries: a systematic review and meta-analysis. *AIDS.* 2012;26:2039–2052.

48. Pépin J, Abou Chakra CN, Pépin E, Nault V, Valiquette L. Evolution of the global burden of viral infections from unsafe medical injections, 2000-2010. *PLoS One*. 2014;9:e99677.
49. Blood safety and availability. Geneva: World Health Organization; 2015 (Fact Sheet No. 279; <http://www.who.int/mediacentre/factsheets/fs279/en>, accessed 31 October 2015).
50. Beyrer C, Baral S, Kerrigan D, El-Bassel N, Bekker LG, Celentano DD. Expanding the space: inclusion of most-at-risk populations in HIV prevention, treatment, and care services. *J Acquir Immune Defic Syndr*. 2011;57(Suppl. 2):S96–9.
51. Beyrer C, Baral SD, van Griensven F, Goodreau SM, Chariyalertsak S, Wirtz AL et al. Global epidemiology of HIV infection in men who have sex with men. *Lancet*. 2012;380:367–77.
52. Baral S, Beyrer C, Muessig K, Poteat T, Wirtz AL, Decker MR et al. Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Infect Dis*. 2012;12:538–49.
53. Baral SD, Poteat T, Strömdahl S, Wirtz AL, Guadamuz TE, Beyrer C. Worldwide burden of HIV in transgender women: a systematic review and meta-analysis. *Lancet Infect Dis*. 2013;13:214–22.
54. World drug report 2015. Vienna: United Nations Office on Drugs and Crime; 2015 (http://www.unodc.org/documents/wdr2015/World_Drug_Report_2015.pdf, accessed 31 October 2015).
55. Men who have sex with men: monitoring implementation of the Dublin Declaration on Partnership to Fight HIV/AIDS in Europe and Central Asia: 2012 progress report. Evidence brief. Stockholm: European Centre for Disease Prevention and Control; 2013.
56. Beyrer C, Sullivan P, Sanchez J, Baral SD, Collins C, Wirtz AL et al. The increase in global HIV epidemics in MSM. *AIDS*. 2013;27:2665–78.
57. HIV in the WHO African Region: progress towards achieving universal access to priority health sector interventions – 2013 update. Brazzaville: WHO Regional Office for Africa; 2013 (<http://www.afro.who.int/en/clusters-a-programmes/dpc/acquired-immune-deficiency-syndrome/features/3950-hiv-in-the-who-african-region-progress-towards-achieving-universal-access-to-priority-health-sector-interventions-2013-update.html>, accessed 31 October 2015).
58. Beattie TS, Mohan HL, Bhattacharjee P, Chandrashekar S, Isac S, Wheeler T et al. Community mobilization and empowerment of female sex workers in Karnataka State, South India: associations with HIV and sexually transmitted infection risk. *Am J Public Health*. 2014;104:1516–25.
59. Mise a jour de Profile épidémiologique: R D Congo. Kinshasa: Ministry of Health, National AIDS Programme; 2014.
60. UNODC Scientific Consultation “Science addressing drugs and HIV: state of the art of harm reduction”: a scientific statement. *Drug Policy*. 2015;26(Suppl 1):S1–4.
61. Abdul-Quader AS, Feelemyer J, Modi S, Stein ES, Briceno A, Semaan S et al. Effectiveness of structural-level needle/syringe programs to reduce HCV and HIV infection among people who inject drugs: a systematic review. *AIDS Behav*. 2013;17:2878–92.
62. Waal H, Clausen T, Gjersing L, Gossop M. Open drug scenes: responses of five European cities. *BMC Public Health*. 2014;14:853.
63. Jones L, Pickering L, Sumnall H, McVeigh J, Bellis A. A review of the effectiveness and cost-effectiveness of needle and syringe programs for injecting drug users. Liverpool: Centre for Public Health, Liverpool John Moores University; 2008.
64. Palmateer N, Kimber J, Hickman M, Hutchinson S, Rhodes T, Goldberg D. Evidence for the effectiveness of sterile injecting equipment provision in preventing hepatitis C and human immunodeficiency virus transmission among injecting drug users: a review of reviews. *Addiction*. 2010;105:844–59.
65. Wodak A, Cooney A. Effectiveness of sterile needle and syringe programs. *Int J Drug Policy*. 2005;16:31–44.
66. MacArthur GJ, Minozzi S, Martin N, Vickerman P, Deren S, Bruneau J et al. Opiate substitution treatment and HIV transmission in people who inject drugs: systematic review and meta-analysis. *BMJ*. 2012;345:e5945.
67. Wilson DP, Donald B, Shattock AJ, Wilson D, Fraser-Hurt N. The cost-effectiveness of harm reduction. *Int J Drug Policy*. 2015;26(Suppl. 1):S5–11.
68. World drug report 2014. Vienna: United Nations Office on Drugs and Crime; 2014.
69. Vitek CR, akalo JI, Kruglov YV, Dumchev KV, Salyuk TO, Boži evi I et al. Slowing of the HIV epidemic in Ukraine: evidence from case reporting and key population surveys, 2005–2012. *PLoS One*. 2014;9:e103657.
70. Nizova N, Islam Z. Integrating TB services into harm reduction services in the eastern European context. AIDS 2014 workshop on increasing access to TB services as part of integrated care for people who inject drugs, 20th International AIDS Conference, Melbourne, Australia, 20–25 July 2014.

71. WHO, UNAIDS, UNODC. Interventions to address HIV in prisons: effectiveness of interventions to address HIV in prisons. Geneva: World Health Organization; 2007 (https://www.unodc.org/documents/hiv-aids/EVIDENCE%20FOR%20ACTION%202007%20sexual_transmission.pdf, accessed 31 October 2015).
72. Jürgens R, Ball A, Verster A. Interventions to reduce HIV transmission related to injecting drug use in prison. *Lancet Infect Dis.* 9:57–66.
73. Dolan K, Moazen B, Noori A, Rahimzadeh S, Farzadfar F, Hariga F. People who inject drugs in prison: HIV prevalence, transmission and prevention. *Int J Drug Policy.* 2015;26(Suppl. 1):S12–5.
74. Wolfe D, Carrieri P, Shepard D. Treatment and care for injecting drug users with HIV infection: a review of barriers and ways forward. *Lancet.* 2010;376:355–66.
75. Pickles M, Boily MC, Vickerman P, Lowndes CM, Moses S, Blanchard JF et al. Assessment of the population-level effectiveness of the Avahan HIV-prevention programme in South India: a preplanned, causal-pathway-based modeling analysis. *Lancet Glob Health.* 2013;1:e289–99.
76. Alary M, Banandur P, Rajaram SP, Thamattoor UK, Mainkar MK, Paranjape R et al. Increased HIV prevention program coverage and decline in HIV prevalence among female sex workers in south India. *Sex Transm Dis.* 2014;41:380–7.
77. Halperin DT, de Moya EA, Pérez-Then E, Pappas G, Garcia Calleja JM. Understanding the HIV epidemic in the Dominican Republic: a prevention success story in the Caribbean? *J Acquir Immune Defic Syndr.* 2009;51(Suppl. 1):S52–9.
78. Johnson WD, Diaz RM, Flanders WD, Goodman M, Hill AN, Holtgrave D et al. Behavioral interventions to reduce risk for sexual transmission of HIV among men who have sex with men. *Cochrane Database Syst Rev.* 2008;(3):CD001230.
79. Thilakavathi S, Boopathi K, Girish Kumar C, Santhakumar A, Senthilkumar R, Eswaramurthy C et al. Assessment of the scale, coverage and outcomes of the Avahan HIV prevention program for female sex workers in Tamil Nadu, India: is there evidence of an effect? *BMC Public Health.* 2011;11(Suppl. 6):S3.
80. Swendeman D, Basu I, Das S, Jana S, Rotheram-Borus MJ. Empowering sex workers in India to reduce vulnerability to HIV and sexually transmitted diseases. *Soc Sci Med.* 2009;69:1157–66.
81. Kerrigan DL, Fonner VA, Stromdahl S, Kennedy CE. Community empowerment among female sex workers is an effective HIV prevention intervention: a systematic review of the peer-reviewed evidence from low- and middle-income countries. *AIDS Behav.* 2013;17:1926–40.
82. Vassall A, Chandrashekar S, Pickles M, Beattie TS, Shetty G, Bhattacharjee P et al. Community mobilisation and empowerment interventions as part of HIV prevention for female sex workers in southern India: a cost-effectiveness analysis. *PLoS One.* 2014;9:e110562.
83. Cremin I, Alsallaq R, Dybul M, Piot P, Garnett G, Hallett TB. The new role of antiretrovirals in combination HIV prevention: a mathematical modelling analysis. *AIDS.* 2013;27:447–58.
84. Hankins CA, Dybul MR. The promise of pre-exposure prophylaxis with antiretroviral drugs to prevent HIV transmission: a review. *Curr Opin HIV AIDS.* 2013;8:50–8.
85. Cohen MS, Chen YQ, McCauley M, Gamble T, Hosseinipour MC, Kumarasamy N et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med.* 2011;365:493–505.
86. Tanser F, Barnighausen T, Grapsa E, Zaidi J, Newell ML. High coverage of ART associated with decline in risk of HIV acquisition in rural KwaZulu-Natal, South Africa. *Science.* 2013;339:966–71.
87. Baeten J, Heffron R, Kidoguchi L, Mugo N, Katabira E, Bukusi E et al. Near elimination of HIV transmission in a demonstration project of PrEP and ART. 2015 Conference on Retroviruses and Opportunistic Infections, Seattle, WA, USA 23–26 February 2015 (abstract 24; <http://www.croiconference.org/sessions/near-elimination-hiv-transmission-demonstration-project-prep-and-art>, accessed 31 October 2015).
88. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. Geneva: World Health Organization; 2015 (<http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en>, accessed 31 October 2015).
89. McCormack S, Dunn D. Pragmatic open-label randomised trial of pre-exposure prophylaxis: the PROUD study. 2015 Conference on Retroviruses and Opportunistic Infections, Seattle, WA, USA 23–26 February 2015 (abstract 22LB; <http://www.croiconference.org/sessions/pragmatic-open-label-randomised-trial-preexposure-prophylaxis-proud-study>, accessed 31 October 2015).
90. Molina J-M, Capitant C, Spire B, Pialoux G, Chidiac C, Charreau I et al. On-demand PrEP with oral TDF-FTC in MSM: results of the ANRS Ipergay trial. 2015 Conference on Retroviruses and Opportunistic Infections, Seattle, WA, USA

23–26 February 2015 (Abstract 23LB; <http://www.croiconference.org/sessions/demand-prep-oral-tdf-ftc-msm-results-anrs-ipergay-trial>, accessed 31 October 2015).

91. Grant RM, Lama JR, Anderson PL, McMahan V, Liu AY, Vargas L et al. Pre-exposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med*. 2010;363:2587–99.
92. Baeten JM, Donnell D, Ndase P, Mugo NR, Campbell JD, Wangisi J et al. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med*. 2012;367:399–410.
93. Choopanya K, Martin M, Suntharasamai P, Sangkum U, Mock PA, Leethochawalit M et al. Antiretroviral prophylaxis for HIV infection in injecting drug users in Bangkok, Thailand (the Bangkok Tenofovir Study): a randomised, double-blind, placebo-controlled phase 3 trial. *Lancet*. 2013;381:2083–90.
94. Marrazzo JM, Ramjee G, Richardson BA, Gomez K, Mgodini N, Nair G et al. Tenofovir-based preexposure prophylaxis for HIV infection among African women. *N Engl J Med*. 2015;372:509–18.
95. Corneli AL, Deese J, Wang M, Taylor D, Ahmed K, Agot K et al. FEM-PrEP: adherence patterns and factors associated with adherence to a daily oral study product for pre-exposure prophylaxis. *J Acquir Immune Defic Syndr*. 2014;66:324–31.
96. Martin M, Vanichseni S, Suntharasamai P, Sangkum U, Mock PA, Leethochawalit M et al. The impact of adherence to preexposure prophylaxis on the risk of HIV infection among people who inject drugs. *AIDS*. 2015;29:819–24.
97. Alistair SS, Grant PM, Bendavid E. Comparative effectiveness and cost-effectiveness of antiretroviral therapy and pre-exposure prophylaxis for HIV prevention in South Africa. *BMC Med*. 2014;12:46.
98. Volk JE, Marcus JL, Phengrasamy T, Blechinger D, Nguyen DP, Follansbee S et al. No new HIV infections with increasing use of HIV pre-exposure prophylaxis in a clinical practice setting. *Clin Infect Dis*. 10.1093/cid/civ778. [Epub ahead of print]
99. Irvine C, Egan KJ, Shubber Z, Van Rompay KK, Beanland RL, Ford N. Efficacy of HIV post-exposure prophylaxis: systematic review and meta-analysis of nonhuman primate studies. *Clin Infect Dis*. 2015;60(Suppl. 3):S165–9.
100. WHO and ILO. Post-exposure prophylaxis to prevent HIV infection. Joint WHO/ILO guidelines on post-exposure prophylaxis (PEP) to prevent HIV infection. Geneva: World Health Organization; 2007 (<http://www.who.int/hiv/pub/guidelines/PEP/en>, accessed 31 October 2015).
101. Guidelines on post-exposure prophylaxis for HIV and the use of co-trimoxazole prophylaxis for HIV-related infections among adults, adolescents and children. Recommendations for a public health approach – December 2014 supplement to the 2013 consolidated ARV guidelines. Geneva: World Health Organization; 2014 (http://www.who.int/hiv/pub/guidelines/arv2013/arvs2013supplement_dec2014/en, accessed 31 October 2015).
102. Consolidated guidelines on HIV prevention, diagnosis, treatment and care for key populations. Geneva: World Health Organization; 2014 (http://apps.who.int/iris/bitstream/10665/128048/1/9789241507431_eng.pdf?ua=1&ua=1, accessed 31 October 2015).
103. Jia Z, Mao Y, Zhang F, Ruan Y, Ma Y, Li J et al. Antiretroviral therapy to prevent HIV transmission in serodiscordant couples in China (2003–11): a national observational cohort study. *Lancet*. 2013;382:1195–1203.
104. Kranzer K, Lawn SD, Johnson LF, Bekker LG, Wood R. Community viral load and CD4 count distribution among people living with HIV in a South African township: implications for treatment as prevention. *J Acquir Immune Defic Syndr*. 2013;63:498–505.
105. Birrell PJ, Gill ON, Delpech VC, Brown AE, Desai S, Chadborn TR et al. HIV incidence in men who have sex with men in England and Wales 2001–10: a nationwide population study. *Lancet Infect Dis*. 2013;13:313–8.
106. Volz EM, Ionides E, Romero-Severson EO, Brandt MG, Mokotoff E, Koopman JS. HIV-1 transmission during early infection in men who have sex with men: a phylodynamic analysis. *PLoS Med*. 2013;10:e1001568.
107. Hankins CA, Dybul MR. The promise of pre-exposure prophylaxis with antiretroviral drugs to prevent HIV transmission: a review. *Curr Opin HIV AIDS*. 2013;8:50–8.
108. Marcus JL, Buisker T, Horvath T, Amico KR, Fuchs JD, Buchbinder SP et al. Helping our patients take HIV pre-exposure prophylaxis (PrEP): a systematic review of adherence interventions. *HIV Med*. 2014;15:385–95.
109. Ford N, Mayer KH, World Health Organization Post-exposure Prophylaxis Guideline Development Group. World Health Organization guidelines on post-exposure prophylaxis for HIV: recommendations for a public health approach. *Clin Infect Dis*. 2015;60(Suppl. 3):S161–4.
110. Kennedy CE, Fonner VA, Sweat MD, Okero FA, Baggaley R, O'Reilly KR. Provider-initiated HIV testing and counseling in low- and middle-income countries: a systematic review. *AIDS Behav*. 2013;17:1571–90.

111. Hensen B, Baggaley R, Wong VJ, Grabbe KL, Shaffer N, Lo YR et al. Universal voluntary HIV testing in antenatal care settings: A review of the contribution of provider-initiated testing & counselling. *Trop Med Int Health*. 2012;17:59–70.
112. Fayorsey RN, Saito S, Carter R, Gusmao E, Frederix K, Koech-Keter E, et al. Decentralization of pediatric HIV care and treatment in five sub-Saharan African countries. *J Acquir Immune Defic Syndr*. 2013;62:e124–30.
113. Penazzato M, Davies M-A, Apollo T, Negussie E, Ford N. Task shifting for the delivery of pediatric antiretroviral treatment: a systematic review. *J Acquir Immune Defic Syndr*. 2014;65:414–22.
114. Republic of South Africa global AIDS response progress report: the 2013 South African mid-term review of the 2011 UN General Assembly Political Declaration on HIV/AIDS targets and elimination commitments. Pretoria: South African National AIDS Council; 2013 (<http://dutblogs.dut.ac.za/hiv aids/wp-content/uploads/2013/10/South-Africa-Global-AIDS-Response-2013.pdf>, accessed 31 October 2015).
115. Suthar AB, Ford N, Bachanas PJ, Wong VJ, Rajan JS, Saltzman AK et al. Towards universal voluntary HIV testing and counseling: a systematic review and meta-analysis of community-based approaches. *PLoS Med*. 2013;10:e1001496.
116. Gagnon M, Cormier L. Governing bodies and spaces: a critical analysis of mandatory human immunodeficiency virus testing in correctional facilities. *ANS Adv Nurs Sci*. 2012;35:145–53.
117. Alvarez-del Arco D, Monge S, Azcoaga A, Rio I, Hernando V, Gonzalez C et al. HIV testing and counselling for migrant populations living in high-income countries: a systematic review. *Eur J Public Health*. 2013;23:1039–45.
118. Zencovich M, Kennedy K, MacPherson DW, Gushulak BD. Immigration medical screening and HIV infection in Canada. *Int J STD AIDS*. 2006;17:813–6.
119. Kumar RA. Ethical and human rights dimensions in prenatal HIV/AIDS testing: Botswana in global perspective. *S Afr J Bioethics Law*. 2012;5:20–26.
120. Male involvement in reproductive health and HIV services: technical brief. Geneva: World Health Organization; 2013.
121. Johnson C, Fonner V, Sands A, Tsui S, Ford N, Wong V et al. Consolidated guidelines on HIV testing services: the 5Cs: consent, confidentiality, counselling, correct results and connection, Annex 14: A report on the misdiagnosis of HIV status. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/180231/1/WHO_HIV_2015.33_eng.pdf, accessed 31 October 2015).
122. Flynn D, Johnson C, Sands A, Wong V, Baggaley R. Consolidated guidelines on HIV testing services: the 5Cs: consent, confidentiality, counselling, correct results and connection, Annex 2: An analysis of 48 national HIV testing and counselling policies. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/180208/1/WHO_HIV_2015.19_eng.pdf?ua=1, accessed 31 October 2015).
123. Barnabas RV, van Rooyen H, Tumwesigye E, Murnane PM, Baeten JM, Humphries H et al. Initiation of antiretroviral therapy and viral suppression after home HIV testing and counselling in KwaZulu-Natal, South Africa, and Mbarara district, Uganda: a prospective, observational intervention study. *Lancet HIV*. 2014;1:e68–76.
124. Madiba S, Mokgatle M. "Students want HIV testing in schools": a formative evaluation of the acceptability of HIV testing and counselling at schools in Gauteng and North West provinces in South Africa. *BMC Public Health*. 2015;15:388.
125. Mabuto T, Latka MH, Kuwane B, Churchyard GJ, Charalambous S, Hoffmann CJ. Four models of HIV counseling and testing: utilization and test results in South Africa. *PLoS One*. 2014;9:e102267.
126. Choko AT, MacPherson P, Webb EL, Willey BA, Feasy H, Sambakunsi R et al. Uptake, accuracy, safety, and linkage into care over two years of promoting annual self-testing for HIV in Blantyre, Malawi: a community-based prospective study. *PLoS Med*. 2015;12:e1001873.
127. Pant Pai N, Sharma J, Shivkumar S, Pillay S, Vadnais C, Joseph L et al. Supervised and unsupervised self-testing for HIV in high- and low-risk populations: a systematic review. *PLoS Med*. 2013;10:e1001414.
128. Krause J, Subklew-Sehume F, Kenyon C, Colebunders R. Acceptability of HIV self-testing: a systematic literature review. *BMC Public Health*. 2013;13:735.
129. Napierala Mavedzenge S, Baggaley R, Corbett EL. A review of self-testing for HIV: research and policy priorities in a new era of HIV prevention. *Clin Infect Dis*. 2013;57:126–38.
130. Becker S, Mlay R, Schwandt HM, Lyamuya E. Comparing couples' and individual voluntary counseling and testing for HIV at antenatal clinics in Tanzania: a randomized trial. *AIDS Behav*. 2010;14:558–66.
131. Hensen B, Taoka S, Lewis JJ, Weiss HA, Hargreaves J. Systematic review of strategies to increase men's HIV-testing in sub-Saharan Africa. *AIDS*. 2014;28:2133–45.

132. UNICEF global databases, 2013, based on DHS, MICS and other national surveys, 2006–2012 [online database]. New York: UNICEF; 2013 (<http://data.unicef.org>, accessed 31 October 2015).
133. Report prepared for the IeDEA-WHO Collaboration: global analysis of delays from ART eligibility to antiretroviral treatment (ART) initiation among adults, on behalf of the International Epidemiologic Databases to Evaluate AIDS (IeDEA). New York: City University of New York (CUNY); 2015.
134. Mugglin C, Wandeler G, Estill J, Egger M, Bender N, Davies MA et al. Retention in care of HIV-infected children from HIV test to start of antiretroviral therapy: systematic review. *PLoS One*. 2013;8:e56446.
135. Govindasamy D, Ford N, Kranzer K. Risk factors, barriers and facilitators for linkage to ART care in sub-Saharan Africa: a systematic review. *AIDS*. 2012;26:2059–67.
136. Bastard M, Nicolay N, Szumilin E, Balkan S, Poulet E, Pujades-Rodriguez M. Adults receiving HIV care before the start of antiretroviral therapy in sub-Saharan Africa: patient outcomes and associated risk factors. *J Acquir Immune Defic Syndr*. 2013;64:455–63.
137. Faal M, Naidoo N, Glencross DK, Venter WD, Osih R. Providing immediate CD4 count results at HIV testing improves ART initiation. *J Acquir Immune Defic Syndr*. 2011;58:e54–9.
138. Govindasamy D, Meghij J, Kebede Negussi E, Clare Baggaley R, Ford N, Kranzer K. Interventions to improve or facilitate linkage to or retention in pre-ART (HIV) care and initiation of ART in low- and middle-income settings – a systematic review. *J Int AIDS Soc*. 2014;17:19032.
139. Kohler PK, Chung MH, McGrath CJ, Benki-Nugent SF, Thiga JW et al. Implementation of free cotrimoxazole prophylaxis improves clinic retention among antiretroviral therapy ineligible clients in Kenya. *AIDS*. 2011;25:1657–61.
140. WHO, UNICEF, UNAIDS. Global update on HIV treatment 2013: results, impact and opportunities. Geneva: World Health Organization; 2013 (http://apps.who.int/iris/bitstream/10665/128048/1/9789241507431_eng.pdf?ua=1, accessed 31 October 2015).
141. Brown LB, Miller WC, Kamanga G, Nyirenda N, Mmodzi P, Pettifor A et al. HIV partner notification is effective and feasible in sub-Saharan Africa: opportunities for HIV treatment and prevention. *J Acquir Immune Defic Syndr*. 2011;56:437–42.
142. Medley A, Bachanas P, Grillo M, Hasen N, Amanyeiwe U. Integrating prevention interventions for people living with HIV into care and treatment programs: a systematic review of the evidence. *J Acquir Immune Defic Syndr*. 2015;68(Suppl. 3):S286–96.
143. Antiretroviral therapy for HIV infection in adults and adolescents. Recommendations for a public health approach: 2010 revision. Geneva: World Health Organization; 2010 (<http://www.who.int/hiv/pub/arv/adult2010/en>, accessed 31 October 2015).
144. Luz PM, Girouard MP, Grinsztejn B, Freedberg KA, Veloso VG, Losina E et al. Survival benefits attributable to the Brazilian national antiretroviral therapy policy. 2015 Conference on Retroviruses and Opportunistic Infections, Seattle, WA, 23–26 February 2015 (Abstract 1119).
145. Harries AD, Libamba E, Schouten EJ, Mwansambo A, Salaniponi FM, Mpazanje R. Expanding antiretroviral therapy in Malawi: drawing on the country's experience with tuberculosis. *BMJ*. 2004;329:1163–6.
146. Kasper T, Coetzee D, Louise F, Boule A, Hilderbrand K. Demystifying antiretroviral therapy in resource-poor settings. *Essential Drugs Monitor*. 2003;32.
147. Bekker LG, Venter F, Cohen K, Goemare E, Van Cutsem G, Boule A et al. Provision of antiretroviral therapy in South Africa: the nuts and bolts. *Antivir Ther*. 2014;19(Suppl. 3):105–16.
148. Centers for Disease Control and Prevention. Differences between HIV-infected men and women in antiretroviral therapy outcomes – six African countries, 2004–2012. *MMWR Morb Mortal Wkly Rep*. 2013;62:946–52.
149. Gari S, Martin-Hilber A, Malungo JR, Musheke M, Merten S. Sex differentials in the uptake of antiretroviral treatment in Zambia. *AIDS Care*. 2014;26:1258–62.
150. Kipp W, Alibhai A, Saunders LD, Senthilselvan A, Kaler A, Konde-Lule J et al. Gender differences in antiretroviral treatment outcomes of HIV patients in rural Uganda. *AIDS Care*. 2010;22:271–8.
151. Koole O, Tsui S, Wabwire-Mangen F, Kwasigabo G, Menten J, Mulenga M et al. Retention and risk factors for attrition among adults in antiretroviral treatment programmes in Tanzania, Uganda and Zambia. *Trop Med Int Health*. 2014;19:1397–1410.
152. Druyts E, Dybul M, Kanters S, Nachega J, Birungi J, Ford N et al. Male sex and the risk of mortality among individuals enrolled in antiretroviral therapy programs in Africa: a systematic review and meta-analysis. *AIDS*. 2013;27:417–25.

153. Do HM, Dunne MP, Kato M, Pham CV, Nguyen KV. Factors associated with suboptimal adherence to antiretroviral therapy in Viet Nam: a cross-sectional study using audio computer-assisted self-interview (ACASI). *BMC Infect Dis.* 2013;13:154.
154. Spillane H, Nicholas S, Tang Z, Szumilin E, Balkan S, Pujades-Rodriguez M. Incidence, risk factors and causes of death in an HIV care programme with a large proportion of injecting drug users. *Trop Med Int Health.* 2012;17:1255–63.
155. People Living with HIV Stigma Index [website]. Amsterdam: GNP+; 2015 (<http://www.stigmaindex.org>, accessed 31 October 2015).
156. State-sponsored homophobia. A world survey of laws: criminalization, protection and recognition of same-sex love. Brussels: International Lesbian and Gay Association; 2013.
157. Chiu J, Burrell S. Punitive drug laws and the risk environment for injecting drug users: understanding the connections. New York: Technical Advisory Group of the Global Commission on HIV and the Law; 2011.
158. Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. *J Int AIDS Soc.* 2013;16(3 Suppl. 2):18640.
159. Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S. A systematic review of interventions to reduce HIV-related stigma and discrimination from 2002 to 2013: how far have we come? *J Int AIDS Soc.* 2013;16(3 Suppl. 2):18734.
160. Global Price Reporting Mechanism [online database]. Geneva: World Health Organization; 2015 (<http://apps.who.int/hiv/amds/price/hdd>, accessed 31 October 2015).
161. Tagar E, Sundaram M, Condliffe K, Matatiyo B, Chimbwandira F, Chilima B et al. Multi-country analysis of treatment costs for HIV/AIDS (MATCH): facility-level ART unit cost analysis in Ethiopia, Malawi, Rwanda, South Africa and Zambia. *PLoS One.* 2014;9:e108304.
162. Report on costs of treatment in the President's Emergency Plan for AIDS Relief (PEPFAR). Washington (DC): United States President's Emergency Plan for AIDS Relief; 2013.
163. Pascual F. Intellectual property rights, market competition and access to affordable antiretrovirals. *Antivir Ther.* 2014;19(Suppl. 3):57–67.
164. Rosen S, Fox MP. Retention in HIV care between testing and treatment in sub-Saharan Africa: a systematic review. *PLoS Med.* 2011;8:e1001056.
165. Kranzer K, Govindasamy D, Ford N, Johnston V, Lawn SD. Quantifying and addressing losses along the continuum of care for people living with HIV infection in sub-Saharan Africa: a systematic review. *J Int AIDS Soc.* 2012;15:17383.
166. IeDEA and ART Cohort Collaborations, Avila D, Althoff KN, Mugglin C, Wools-Kaloustian K, Koller M et al. Immunodeficiency at the start of combination antiretroviral therapy in low-, middle-, and high-income countries. *J Acquir Immune Defic Syndr.* 2014;65:e8–16.
167. Kiertiburanakul S, Boettiger D, Lee MP, Omar SF, Tanuma J, Ng OT et al. Trends of CD4 cell count levels at the initiation of antiretroviral therapy over time and factors associated with late initiation of antiretroviral therapy among Asian HIV-positive patients. *J Int AIDS Soc.* 2014;17:18804.
168. Lahuerta M, Wu Y, Hoffman S, Elul B, Kulkarni SG, Remien RH et al. Advanced HIV disease at entry into HIV care and initiation of antiretroviral therapy during 2006-2011: findings from four sub-Saharan African countries. *Clin Infect Dis.* 2014;58:432–41.
169. Pascom AR, Habckost C, Mesquita F. Treatment as prevention in Brazil: speeding up the pace to reach the 90–90–90 targets. 8th IAS Conference on HIV Pathogenesis, Treatment and Prevention, Vancouver, Canada, 19–22 July 2015 (Abstract MOPED 739).
170. Maximizing the treatment and prevention potential of antiretroviral drugs: early country experiences towards implementing a treat-all policy. Geneva; World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/183599/1/WHO_HIV_2015.35_eng.pdf, accessed 31 October 2015).
171. INSIGHT START Study Group, Lundgren JD, Babiker AG, Gordin F, Emery S, Grund B et al. Initiation of antiretroviral therapy in early asymptomatic HIV infection. *N Engl J Med.* 2015;373:795–807.
172. TEMPRANO ANRS 12136 Study Group, Danel C, Moh R, Gabillard D, Badje A, Le Carrou J et al. A trial of early antiretrovirals and isoniazid preventive therapy in Africa. *N Engl J Med.* 2015;373:808–22.
173. Report prepared for the IeDEA-WHO Collaboration: global analysis of viral suppression on ART, on behalf of the International Epidemiologic Databases to Evaluate AIDS (IeDEA). Sydney: University of New South Wales; 2015.

174. Elul B, Basinga P, Nuwagaba-Biribonwoha H, Saito S, Horowitz D, Nash D et al. High levels of adherence and viral suppression in a nationally representative sample of HIV-infected adults on antiretroviral therapy for 6, 12 and 18 months in Rwanda. *PLoS One*. 2013;8:e53586.
175. HIV, viral hepatitis and sexually transmissible infections in Australia Annual Surveillance Report 2014. Sydney: Kirby Institute for Infection and Immunity in Society; 2014.
176. HIV in the United Kingdom: 2014 report. London: Public Health England; 2014.
177. De Beaudrap P, Thiam M, Diouf A, Toure-Kane C, Ngom-Guèye NF, Vidal N et al. Risk of virological failure and drug resistance during first and second-line antiretroviral therapy in a 10-year cohort in Senegal: results from the ANRS 1215 cohort. *J Acquir Immune Defic Syndr*. 2013;62:381–7.
178. Report prepared for the leDEA-WHO Collaboration: global analysis of retention in care in initial HIV care and treatment program, on behalf of the International Epidemiologic Databases to Evaluate AIDS. Berne: University of Berne; 2015.
179. Al-Dakkak I, Patel S, McCann E, Gadkari A, Prajapati G, Maiese EM. The impact of specific HIV treatment-related adverse events on adherence to antiretroviral therapy: a systematic review and meta-analysis. *AIDS Care*. 2013;25:400–14.
180. Ramjan R, Calmy A, Vitoria M, Mills E, Cooke G, Ford N. Patient and programme impact of fixed-dose combination antiretroviral therapy: a systematic review and meta-analysis. *Trop Med Int Health*. 2014;19:501–13.
181. ENCORE1 Study Group. Efficacy and safety of efavirenz 400 mg daily versus 600 mg daily: 96-week data from the randomised, double-blind, placebo-controlled, non-inferiority ENCORE1 study. *Lancet Infect Dis*. 2015;15:793–802.
182. Stellbrink HJ, Reynes J, Lazzarin A, Voronin E, Pulido F, Felizarta F et al. SPRING-1 Team. Dolutegravir in antiretroviral-naïve adults with HIV-1: 96-week results from a randomized dose-ranging study. *AIDS*. 2013;27:1771–8.
183. Richman DD, Little SJ, Smith DM, Wrin T, Petropoulos C, Wong JK. HIV evolution and escape. *Trans Am Clin Climatol Assoc*. 2004;115:289–303.
184. Moore HA. Reflections on six years of paediatric ART. *S Afr J HIV Med*. 2014;15:22–3.
185. McMahon JH, Elliott JH, Hong SY, Bertagnolio S, Jordan MR. Effects of physical tracing on estimates of loss to follow-up, mortality and retention in low and middle income country antiretroviral therapy programs: a systematic review. *PLoS One*. 2013;8:e56047.
186. Hong SY, Jonas A, Dumeni E, Badi A, Pereko D, Blom A et al. Population-based monitoring of HIV drug resistance in Namibia with early warning indicators. *J Acquir Immune Defic Syndr*. 2010;55:27–31.
187. Hedt BL, Wadonda-Kabondo N, Makombe S, Harries AD, Schouten EJ, Limbambala E et al. Early warning indicators for HIV drug resistance in Malawi. *Antivir Ther*. 2008;13(Suppl. 2):69–75.
188. Luque-Fernandez MA, Van Cutsem G, Goemaere E, Hilderbrand K, Schomaker M, Mantangana N et al. Effectiveness of patient adherence groups as a model of care for stable patients on antiretroviral therapy in Khayelitsha, Cape Town, South Africa. *PLoS One*. 2013;8:e56088.
189. Vinikoor MJ, Schuttner L, Moyo C, Li M, Musonda P, Hachaambwa LM et al. Short communication: Late refills during the first year of antiretroviral therapy predict mortality and program failure among HIV-infected adults in urban Zambia. *AIDS Res Hum Retroviruses*. 2014;30:74–7.
190. Bennett DE, Jordan MR, Bertagnolio S, Hong SY, Ravasi G, McMahon JH et al. HIV drug resistance early warning indicators in cohorts of individuals starting antiretroviral therapy between 2004 and 2009: World Health Organization global report from 50 countries. *Clin Infect Dis*. 2012;54(Suppl. 4):S280–9.
191. Mbuagbaw L, van der Kop ML, Lester RT, Thirumurthy H, Pop-Eleches C, Ye C et al. Mobile phone text messages for improving adherence to antiretroviral therapy (ART): an individual patient data meta-analysis of randomised trials. *BMJ Open*. 2013;3:e003950.
192. Mills EJ, Lester R, Thorlund K, Lorenzi M, Muldoon K, Kanters S et al. Interventions to promote adherence to antiretroviral therapy in Africa: a network meta-analysis. *Lancet*. 2014;1: e104–11.
193. Maduka O, Tobin-West CI. Adherence counseling and reminder text messages improve uptake of antiretroviral therapy in a tertiary hospital in Nigeria. *Niger J Clin Pract*. 2013;16:302–8.
194. Bärnighausen T, Chaiyachati K, Chimbindi N, Peoples A, Haberer J, Newell ML. Interventions to increase antiretroviral adherence in sub-Saharan Africa: a systematic review of evaluation studies. *Lancet Infect Dis*. 2011;11:942–51.
195. Finitis DJ, Pellowski JA, Johnson BT. Text message intervention designs to promote adherence to antiretroviral therapy (ART): a meta-analysis of randomized controlled trials. *PLoS One*. 2014;9:e88166.

196. Fatti G, Grimwood A, Bock P. Better antiretroviral therapy outcomes at primary healthcare facilities: an evaluation of three tiers of ART services in four South African provinces. *PLoS One*. 2010;5:e12888
197. Massaquoi M, Zachariah R, Manzi M, Pasulani O, Misindi D, Mwangomba B et al. Patient retention and attrition on antiretroviral treatment at district level in rural Malawi. *Trans R Soc Trop Med Hyg*. 2009;103:594–600.
198. Fayorsey RN, Saito S, Carter RJ, Gusmao E, Frederix K, Koech-Keter E et al. Decentralization of pediatric HIV care and treatment in five sub-Saharan African countries. *J Acquir Immune Defic Syndr*. 2013;62:e124–30.
199. Hagströmer O, Lundstedt L, Balcha TT, Björkman P. Decentralised paediatric HIV care in Ethiopia: a comparison between outcomes of patients managed in health centres and in a hospital clinic. *Glob Health Action*. 2013;6:22274.
200. Kredo T, Ford N, Adeniyi FB, Garner P. Decentralising HIV treatment in lower- and middle income countries. *Cochrane Database Syst Rev*. 2013;6:CD009987.
201. Maharaj T et al. Strategies to address clinic waiting time and retention in care; lessons from a large ART center in South Africa. 17th International Conference on AIDS and STIs in Africa, Cape Town, 2013 (Abstract ADS058).
202. Koole O, Tsui S, Wabwire-Mangen F, Kwesigabo G, Menten J, Mulenga M et al. Retention and risk factors for attrition among adults in antiretroviral treatment programs in Tanzania, Uganda and Zambia. 19th International AIDS Conference, Washington, DC, 22–27 July 2012 (Abstract MOAC0305; <http://pag.aids2012.org/abstracts.aspx?aid=4442>, accessed 31 October 2015).
203. Bemelmans M, Baert S, Goemaere E, Wilkinson L, Vandendyck M, van Cutsem G et al. Community-supported models of care for people on HIV treatment in sub-Saharan Africa. *Trop Med Int Health*. 2014;19:968–77.
204. Grimwood A, Fatti G, Mothibi E, Malahlela M, Shea J, Eley B. Community adherence support improves programme retention in children on antiretroviral treatment: a multicentre cohort study in South Africa. *J Int AIDS Soc*. 2012;15:17381.
205. Lamb MR, Fayorsey R, Nuwagaba-Birbonwoha H, Viola V, Mutabazi V, Alwar T et al. High attrition before and after ART initiation among youth (15-24 years of age) enrolled in HIV care. *AIDS*. 2014;28:559–68.
206. WHO HIV drug resistance report 2012. Geneva: World Health Organization; 2012 (<http://www.who.int/hiv/pub/drugresistance/report2012/en>, accessed 31 October 2015).
207. Gupta RK, Jordan MR, Sultan BJ, Hill A, Davis DHJ, Gregson J et al. Global trends in antiretroviral resistance in untreated HIV-1 infected individuals following ART roll-out in resource-limited settings: a global collaborative study and meta-regression analysis. *Lancet*. 2012;380:1250–8.
208. Rhee SY, Blanco JL, Jordan MR, Taylor J, Lemey P, Varghese V et al. Geographic and temporal trends in the molecular epidemiology and genetic mechanisms of transmitted HIV-1 drug resistance: an individual-patient- and sequence-level meta-analysis. *PLoS Med*. 2015;12:e1001810.
209. Petersen ML, Tran L, Geng EH, Reynolds SJ, Kambugu A, Wood R et al. Delayed switch of antiretroviral therapy after virologic failure associated with elevated mortality among HIV-infected adults in Africa. *AIDS*. 2014;28:2097–107.
210. WHO global strategy for the surveillance and monitoring of HIV drug resistance 2012. Geneva: World Health Organization; 2012 (http://apps.who.int/iris/bitstream/10665/77349/1/9789241504768_eng.pdf?ua=1, accessed 31 October 2015).
211. Consolidated strategic information guidelines for HIV in the health sector. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/164716/1/9789241508759_eng.pdf?ua=1&ua=1, accessed 31 October 2015).
212. Fox MP, Rosen SJ. Retention of adult patients on antiretroviral therapy in low- and middle-income countries: systematic review and meta-analysis 2008–2013. *Acquir Immune Defic Syndr*. 2015;69:98–108.
213. Chalker JC, Andualet T, Gitau LN, Ntaganira J, Obua C, Tadege H et al. Measuring adherence to antiretroviral treatment in resource-poor settings: the feasibility of collecting routine data for key indicators. *BMC Health Serv Res*. 2010;10:43.
214. Pasquet A, Messou E, Gabillard D, Minga A, Depoulosky A, Deuffic-Burban S et al. Impact of drug stock-outs on death and retention to care among HIV-infected patients on combination antiretroviral therapy in Abidjan, Côte d'Ivoire. *PLoS One*. 2010;5:e13414.
215. Koller M, Patel K, Chi BH, Wools-Kaloustian K, Dicko F, Chokeyhaibulkit K et al. Immunodeficiency in children starting antiretroviral therapy in low-, middle-, and high-income countries. *J Acquir Immune Defic Syndr*. 2015;68:62–72.

216. Bakanda C, Birungi J, Mwesigwa R, Nachega JB, Chan K, Palmer A, et al. Survival of HIV-infected adolescents on antiretroviral therapy in Uganda: findings from a nationally representative cohort in Uganda. *PLoS One*. 2011;6:e19261.
217. Evans D, Menezes C, Mahomed K, Macdonald P, Untiedt S, Levin L et al. Treatment outcomes of HIV-infected adolescents attending public-sector HIV clinics across Gauteng and Mpumalanga, South Africa. *AIDS Res Hum Retroviruses*. 2013;29:892–900.
218. Wringe A, Floyd S, Kazooba P, Mushati P, Baisley K, Urassa M et al. Antiretroviral therapy uptake and coverage in four HIV community cohort studies in sub-Saharan Africa. *Trop Med Int Health*. 2012;17:e38–48.
219. Kasedde S, Luo C, McClure C, Chandan U. Reducing HIV and AIDS in adolescents: opportunities and challenges. *Curr HIV/AIDS Rep*. 2013;10:159–68.
220. Bygrave H, Mtangirwa J, Ncube K, Ford N, Kranzer K, Munyaradzi D. Antiretroviral therapy outcomes among adolescents and youth in rural Zimbabwe. *PLoS One*. 2012;7:e52856.
221. Bakanda C, Birungi J, Mwesigwa R, Nachega JB, Chan K, Palmer A et al. Survival of HIV-infected adolescents on antiretroviral therapy in Uganda: findings from a nationally representative cohort in Uganda. *PLoS One*. 2011;6:e19261.
222. Evans D, Menezes C, Mahomed K, Macdonald P, Untiedt S, Levin L et al. Treatment outcomes of HIV-infected adolescents attending public-sector HIV clinics across Gauteng and Mpumalanga, South Africa. *AIDS Res Hum Retroviruses*. 2013;29:892–900.
223. Woldesenbet SA, Jackson D, Goga AE, Crowley S, Doherty T, Mogashoa MM et al. Missed opportunities for early infant HIV diagnosis: results of a national study in South Africa. *J Acquir Immune Defic Syndr*. 2015;68:e26–32.
224. Penazzato M, Davies M-A, Apollo T, Ford N. Task shifting in the provision of antiretroviral therapy to children: a systematic review. *J Acquir Immune Defic Syndr*. 2014;65:414–22.
225. Finocchiaro-Kessler S, Gautney BJ, Khamadi S, Okoth V, Goggin K, Spinler JK et al. If you text them, they will come: using the HIV infant tracking system to improve early infant diagnosis quality and retention in Kenya. *AIDS*. 2014;28 Suppl 3:S313–S321.
226. HIV and adolescents: guidance for HIV testing and counselling and care for adolescents living with HIV: recommendations for a public health approach and considerations for policy-makers and managers. Geneva: World Health Organization; 2013 (<http://www.who.int/hiv/pub/guidelines/adolescents/en>, accessed 31 October 2015).
227. Ford N, Shubber Z, Meintjes G, Grinsztejn B, Eholie S, Mills E et al. Causes of hospital admission among people living with HIV worldwide: a systematic review and meta-analysis. *Lancet HIV*. 2015;2:e438–44.
228. Global tuberculosis report 2015. Geneva: World Health Organization; 2015 (http://www.who.int/tb/publications/global_report/en, accessed 31 October 2015).
229. Kaplan R, Caldwell J, Middelkoop K, Bekker LG, Wood R. Impact of ART on TB case fatality stratified by CD4 count for HIV-positive TB patients in Cape Town, South Africa (2009–2011). *J Acquir Immune Defic Syndr*. 2014;6:487–94.
230. Watera C, Todd J, Muwonge R, Whitworth J, Nakiyingi-Miiri J, Brink A et al. Feasibility and effectiveness of cotrimoxazole prophylaxis for HIV-1-infected adults attending an HIV/AIDS clinic in Uganda. *J Acquir Immune Defic Syndr*. 2006;42:373–8.
231. Nunn AJ, Mwaba P, Chintu C, Mwinga A, Darbyshire JH, Zumla A; UNZA-UCLMS Project LUCOT Collaboration. Role of co-trimoxazole prophylaxis in reducing mortality in HIV infected adults being treated for tuberculosis: randomized clinical trial. *BMJ*. 2008;337:a257.
232. Mathers BM, Degenhardt L, Phillips B, Wiessing L, Hickman M, Strathdee SA et al. Global epidemiology of injecting drugs use and HIV among people who inject drugs: a systematic review. *Lancet*. 2008;372:1733–45.
233. Easterbrook P, Sands A, Harmanchi H. Challenges and priorities in the management of HIV/HBV and HIV/HCV coinfection in resource-limited settings. *Semin Liver Dis*. 2012;32:147–57.
234. Easterbrook P, Platt L, Gower E., Razavi H, Sabin K, Vickerman P. Global systematic review and meta-analysis of the seroprevalence of HBV and HCV infection in HIV-infected persons. 8th IAS Conference on HIV Pathogenesis, Treatment and Prevention, Vancouver, Canada, 19–22 July 2015 (Abstract TUPEB254).
235. Plotkin SA, Orenstein W, Offit PA. *Vaccines*. Philadelphia: Saunders; 2012.
236. Peck RN, Shedafa R, Kalluvya S, Downs JA, Todd J, Suthanthiran M et al. Hypertension, kidney disease, HIV and antiretroviral therapy among Tanzanian adults: a cross-sectional study. *BMC Med*. 2014;12:125.
237. Smith CJ, Ryom L, Weber R, Morlat P, Pradier C, Reiss P et al. Trends in underlying causes of death in people with HIV from 1999 to 2011 (D:A:D): a multicohort collaboration. *Lancet*. 2014;384:241–8.

238. Haregu TN, Oldenburg B, Sestwe G, Elliott J, Nanayakkara V. Epidemiology of co-morbidity of HIV/AIDS and non-communicable diseases in developing countries: a systematic review. *J Glob Health Care Syst.* 2012;2(1).
239. Reiss P. HIV, co-morbidity and ageing. *J Int AIDS Soc.* 2012;15(Suppl. 4):18073.
240. Crosbie EJ, Einstein MH, Franceschi S, Kitchener HC. Human papillomavirus and cervical cancer. *Lancet.* 2013; 382:889–99.
241. Binagwaho A, Ngabo F, Wagner CM, Mugeni C, Gatera M, Nutt CT et al. Integration of comprehensive women's health programmes into health systems: cervical cancer prevention, care and control in Rwanda. *Bull World Health Organ.* 2013;91:697–703.
242. Women, girls, gender equality and HIV: a gender scorecard for eastern and southern Africa. Johannesburg: UNAIDS; 2012.
243. Guidelines for the prevention, care and treatment of persons living with chronic hepatitis B infection. Geneva: World Health Organization; 2015 (<http://apps.who.int/hiv/pub/hepatitis/hepatitis-b-guidelines/en/>, accessed 31 October 2015).
244. Abdul-Quader AS, Feelemyer J, Modi S, Stein ES, Briceno A, Semaan S et al. Effectiveness of structural-level needle/syringe programs to reduce HCV and HIV infection among people who inject drugs: a systematic review. *AIDS Behav.* 2013;17:2878–92.
245. Guidelines for the screening, care and treatment of persons with hepatitis C infection. Geneva: World Health Organization; 2014 (<http://apps.who.int/hiv/pub/hepatitis/hepatitis-b-guidelines/en>, accessed 31 October 2015).
246. Sankaranarayanan R, Anorlu R, Sangwa-Lugoma G, Denny LA. Infrastructure requirements for human papillomavirus vaccination and cervical cancer screening in sub-Saharan Africa. *Vaccine.* 2013;31(Suppl. 5):F47–52.

CHAPTER 3

1. Global Health Sector Strategy on HIV 2016–2021: draft for consultation. Geneva: World Health Organization; 2015 (<http://www.who.int/hiv/proposed-hiv-strategy2016-2021/en>, accessed 31 October 2015).
2. Global Health Sector Strategies 2016–2021. Briefing note: 30.09.15. Geneva: World Health Organization; 2015 (http://www.who.int/hiv/strategy2016-2021/GHSS_at_a_glance_3009015.pdf?ua=1, accessed 31 October 2015).
3. Consolidated strategic information guidelines for HIV in the health sector. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/164716/1/9789241508759_eng.pdf?ua=1&ua=1, accessed 31 October 2015).
4. Tool to set and monitor targets for HIV prevention, diagnosis, treatment and care for key populations. Supplement to the 2014 consolidated guidelines for HIV prevention, diagnosis, treatment and care for key populations. Geneva: World Health Organization; 2015 (http://apps.who.int/iris/bitstream/10665/177992/1/9789241508995_eng.pdf?ua=1&ua=1, accessed 31 October 2015).
5. Migration of health workers: the WHO code of practice and the global economic crisis. Geneva: World Health Organization; 2014 (http://www.who.int/hrh/migration/14075_MigrationofHealth_Workers.pdf, accessed 31 October 2015).
6. The world health report 2010: health systems financing – the path to universal coverage. Geneva: World Health Organization; 2010 (<http://www.who.int/whr/2010/en>, accessed 31 October 2015).
7. Larson C, Burn R, Minnick-Sakal A, Douglas MO, Kuritsky J. Strategies to reduce risks in ARV supply chains in the developing world. *Glob Health Sci Pract.* 2014;2:395–402.
8. Ripin DJ, Jamieson D, Meyers A, Warty U, Dain M, Khamsi C. Antiretroviral procurement and supply chain management. *Antivir Ther.* 2014;19(Suppl 3):79–89.
9. Harmonized monitoring and evaluation indicators for procurement and supply management systems. Early warning indicators to prevent stock-outs and overstocking of antiretroviral, antituberculosis and antimalarial medicines. Geneva: World Health Organization; 2011.
10. Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. *J Int AIDS Soc.* 2013;16(3 Suppl. 2):18640.
11. Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S. A systematic review of interventions to reduce HIV-related stigma and discrimination from 2002 to 2013: how far have we come? *J Int AIDS Soc.* 2013;16(3 Suppl. 2):18734.
12. Innovation for greater impact: exploring resources for domestic health funding in Africa. Washington (DC): Friends of the Global Fight against AIDS, Tuberculosis and Malaria; 2015 (http://theglobalfight.org/wp-content/uploads/Innovation_for_Greater_Impact.pdf, accessed 31 October 2015).

13. Pascual F. Intellectual property rights, market competition and access to affordable antiretrovirals. *Antivir Ther.* 2014;19(Suppl. 3):57–67.
14. Beck EJ, Passarelli C, Lui I, Guichard AC, Simao M, De Lay P et al. Scaling-up the use of generic antiretrovirals in resource-limited countries: generic drugs for health. *Antivir Ther.* 2014;19(Suppl. 3):117–23.
15. Yates R. Universal health care and the removal of user fees. *Lancet.* 2009;373:2078–81.
16. Lagomarsino G, Garabrant A, Adyas A, Muga R, Otoo N. Moving towards universal health coverage: health insurance reforms in nine developing countries in Africa and Asia. *Lancet.* 2012;380:933–43.
17. Binagwaho A, Farmer PE, Nsanzimana S, Karema C, Gasana M, de Dieu Ngirabega J et al. Rwanda 20 years on: investing in life. *Lancet.* 2014; 384:371–5

EXPLANATORY NOTES

1. UNAIDS, UNICEF and WHO. Global AIDS Global AIDS Response Progress Reporting 2015. Geneva: UNAIDS; 2015 (http://www.unaids.org/sites/default/files/media_asset/JC2702_GARPR2015guidelines_en.pdf, accessed 31 October 2015).
2. Global Health Observatory Data Repository [online database]. Geneva: WHO; 2014 (<http://apps.who.int/gho/data/node.main.624?lang=en>, accessed 31 October 2015).
3. UNAIDS 2012–2015 Unified Budget, Results and Accountability Framework: 2014–2015 Results, Accountability and Budget Matrix. Geneva: UNAIDS; 2013 (http://www.unaids.org/en/media/unaids/contentassets/documents/pcb/2013/pcb32/agendaitems/UBRAF_PCB_2014-2015_Matrix_16May2013GMA%20FINAL.pdf, accessed 31 October 2015).
4. Countdown to zero: Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: UNAIDS; 2011 (<http://www.unaids.org/believeitdoit/the-global-plan.html>, accessed 31 October 2015).
5. Stover J, Brown T, Marston M. Updates to the Spectrum/Estimation and Projection Package (EPP) model to estimate HIV trends for adults and children. *Sex Transm Infect.* 2012;88(Suppl. 1):i11–6.
6. Antiretroviral therapy for HIV infection in infants and children: towards universal access. Recommendations for a public health approach. 2010 revision. Geneva: World Health Organization; 2010 (http://whqlibdoc.who.int/publications/2010/9789241599801_eng.pdf, accessed 31 October 2015).
7. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. Geneva: World Health Organization; 2013 (<http://www.who.int/hiv/pub/guidelines/arv2013/en>, accessed 31 October 2015).
8. Guideline on when to start antiretroviral therapy and on pre-exposure prophylaxis for HIV. Geneva: World Health Organization; 2015 (<http://www.who.int/hiv/pub/guidelines/earlyrelease-arv/en>, accessed 31 October 2015).
9. Hallett TB, Zaba B, Stover J, Brown T, Slaymaker E, Gregson S et al. Embracing different approaches to estimating HIV incidence, prevalence and mortality. *AIDS.* 2014;28(Suppl. 4):S523–32
10. Stover J et al. The Spectrum projection package: improvements in estimating mortality, ART needs, PMTCT impact and uncertainty bounds. *Sex Transm Infect.* 2008;84(Suppl 1):i24–30.
11. Data: changes in country classifications [web site]. Washington, DC: World Bank; 2011 (<http://data.worldbank.org/news/2010-GNI-income-classifications>, accessed 31 October 2015).

For more information, contact:

World Health Organization
Department of HIV/AIDS
20, avenue Appia
1211 Geneva 27
Switzerland

E-mail: hiv-aids@who.int

www.who.int/hiv

ISBN 978 92 4 150982 4

