



# THE LANCET

## A UNAIDS–Lancet Commission on Defeating AIDS—Advancing Global Health

### Defeating AIDS—advancing global health



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#### Executive summary

After more than a decade of major achievements, the AIDS response is at a crucial juncture, both in terms of its immediate trajectory and its sustainability, as well as its place in the new global health and development agendas. In May, 2013, the UNAIDS–Lancet Commission—a diverse group of experts in HIV, health, and development, young people, people living with HIV and affected communities, activists, and political leaders—was established to investigate how the AIDS response could evolve in a new era of sustainable development. The UNAIDS–Lancet Commission has come together at a moment when the lessons of the AIDS response, including its whole-of-society perspective, can be informative and even transformational for other spheres of global health. The path to ending AIDS as a public health threat by 2030, as set out in this report, should be a major part of the post-2015 development agenda.

Thanks to considerable resources, leadership, community mobilisation, and innovation, enormous gains have been made in controlling the HIV epidemic, saving millions of people from infection and AIDS-related illness and death. Thus, in 2013, the number of new HIV infections had decreased by 38% since 2001 to 2·1 million, and the number of AIDS-related deaths decreased by 35% since 2005 to 1·5 million. Antiretroviral treatment (ART) fundamentally changed the course of the epidemic by substantially reducing mortality from HIV infection and as part of HIV control strategies. However, many populations around the world are still highly affected by HIV, particularly young women in southern and eastern Africa, men who have sex with men (MSM), sex workers, and injecting drug users. Additionally, there are concerning signs of complacency and setbacks in countries and populations that had previously made substantial progress.

A still expanding armamentarium of proven effective biomedical, behavioural, and structural interventions have been developed for the prevention and treatment of HIV infection. These interventions have a maximum effect when used in combinations that are tailored to the needs and contexts of specific populations. In addition, their programmatic effect is greatest when focused on populations at highest risk and in geographical hot spots, as is now policy in countries such as Kenya. However, as a result of poor strategy, absence of leadership, or

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#### Key recommendations

- Get serious about HIV prevention—including combination prevention—and continue the expansion of access to treatment, while also working to address structural determinants of health that put people at risk
- Forge new paths to uphold human rights and address criminalisation, stigma, and discrimination using practical approaches to change laws, policies, and public attitudes that violate human rights
- Urgently ramp up and fully fund AIDS efforts efficiently, and emphasise sustainability; the next 5 years present a window of opportunity to scale up the AIDS response to end AIDS as a public health problem by 2030; failing to do so, and to continue the already significant efforts, will increase the number of deaths and new HIV infections by 2020
- Demand robust accountability, transparency, and better data; this relies on fresh processes and mechanisms to enable more transparent data review, improve research on high-risk populations, and link data to policies and programmes
- Reinforce and renew the leadership and engagement of people living with HIV, strengthening and expanding their decision-making roles in policy design, implementation, and evaluation, and invest in activism as a global public good
- Invest in research and innovation in all facets of the AIDS response; an effective vaccine and a cure remain priorities, and others include epidemiological studies of high-risk populations and hot spots, socio-behavioural research, implementation research, and country-specific research on how services are delivered across health care
- Promote more inclusive, coherent, and accountable AIDS and health governance; establish a multi-stakeholder, multi-sector platform to address determinants of health

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inadequate resources, such combination prevention does not reach many affected populations, and more than 10 million people who need ART have yet to start treatment (ultimately, all 35 million people living with HIV will need ART). Structural interventions, in particular, have been largely neglected, although they are key to an effective AIDS response. Examples include programmes to reduce gender-based violence and conditional cash transfers that pay girls to stay in or return to school. Access to social protection programmes benefits people living with HIV as they become more resilient and can continue lifelong treatment.

Not enough attention has been paid to HIV testing and viral load monitoring, standardised treatment regimens, more affordable second-line and third-line antiretroviral drugs, quality of chronic HIV care and services, or other needs of people living with HIV (eg, comorbidities and non-communicable diseases in an ageing population, non-discrimination, and employment). Service-delivery platforms used for HIV care and for the prevention of mother-to-child transmission of HIV can be substantially strengthened through operational convergence with other health issues, whereas many of the innovations of the AIDS response can generate momentum for the wider global health community.

Human rights have been a driver of these achievements. However, far more effort is needed to address stigma and discrimination, remove punitive laws, and create enabling legal and social environments for the AIDS response. Some countries have chosen to let sex workers, MSM, transgender people, and injecting drug users die of AIDS rather than change the laws and policies affecting them. AIDS activism and civil society remain crucial for the AIDS response. As such, activism constitutes a global public good, deserving investment commensurate with the part it plays in improving health outcomes.

AIDS is still a relatively new disease and research has been vital to advance HIV control and treatment. The AIDS response has been characterised by its unusually prompt adaptation of new scientific evidence, products, and interventions in its programmes. The scientific community has also been intimately involved in global and national strategy development, advocacy, implementation, and assessment—perhaps more than in other health issues.

Only a massive and rapid expansion of a comprehensive AIDS response between now and 2020 can achieve the highly ambitious UN goal of ending AIDS as a public health threat by 2030. A continuation of already major efforts will mean going backwards: by 2020 there will be more new HIV infections, more AIDS-related deaths, and the costs of controlling the epidemic will continue to escalate. However, if the most is made of this 5 year window of opportunity, HIV transmission should be reduced to low endemic levels, AIDS-related mortality greatly reduced, and mother-to-child transmission virtually eliminated by 2030.

The return on investment in the AIDS response is high. When survival gains are valued in monetary terms as part of a full income approach to economic welfare—as was done for the *Lancet* Commission on Investing in Health report<sup>1</sup>—each life-year gained in low-income and middle-income countries has an estimated value of 2·3 times gross domestic product (GDP) per person. Our modelling suggests that scaling up to the most ambitious scenario would generate benefits of US\$1157 billion between 2014 and 2030. But success is by no means certain, and gains to date are fragile. At the same time, a long-term view is needed to ensure sustainability of achievements.

On the basis of our analysis and discussion, we make the following seven key recommendations.

### **Urgently escalate AIDS efforts, get serious about HIV prevention, and continue expanding access to treatment**

There is an urgent need to do more and to do better now. All aspects of a comprehensive AIDS response must be funded and resources targeted to where they will make the greatest difference. Further expansion of treatment programmes and comprehensive approaches to combination HIV prevention is needed to safeguard achievements and advance the trajectory of the end of AIDS as a public health threat.

To reach all those in need, combination prevention (biomedical, behavioural, and structural interventions) and treatment must be tailored to target marginalised communities and populations most at risk of HIV infection: there is no one-size-fits-all approach. The ultimate goal of treatment is to prevent death from HIV infection and to ensure that treatment reduces transmission in the population. HIV services should be integrated with other health services as much as possible. International action is needed to secure the long-term supply of first-line, second-line, and third-line ARTs and equipment to measure viral load.

### **Mobilise more resources, spend efficiently, and emphasise sustainability**

Large increases in funding will be needed. At present, the high level of efforts costs \$19 billion annually, whereas it will take \$36 billion annually to achieve the UN goal to end AIDS as a public health threat by 2030. Affected countries with financial capacity can and should fund more of their AIDS responses. However, the need for international funding to support highly affected low-income countries remains high, particularly in sub-Saharan Africa. The UN goal, or even a continuation of current efforts, will need large proportions of GDP and total government expenditure in the most affected countries (0·6%–2·1% of GDP and 30·4%–67·1% of government health expenditure from 2014–30 to fund HIV programmes). These estimates do not take into account much needed efficiency gains, including the

more targeted interventions recommended above and major management efficiencies. However, even under the most optimum resource allocation and management, the financial burden on the most affected African countries remains exorbitant.

Explicit results-based agreements (or compacts) between governments and international funding partners are key to manage the transition from external dependence to greater self-sufficiency, from stand-alone to progressively integrated programming, and from a highly stigmatised to a more tolerant legal environment. A similar national compact is needed between parliament, ministry of finance, and institutions in charge of HIV control, even in the absence of external funding.

Maximisation of the synergies of health investment for progress across the Sustainable Development Goal's health agenda, building on the model of the Global Fund to Fight AIDS, Tuberculosis and Malaria, should help to advance the AIDS and health agenda.

#### **Demand robust accountability, transparency, and better data**

Establishment of robust accountability mechanisms at national and sub-national levels relies on the transparent review of data and a mechanism to take results into policy making, including any necessary remedial action. It is imperative that all countries affected by the HIV epidemic gather detailed epidemiological data, including behavioural and response data, from high-risk population groups as part of standard practice. Data need to be more widely disseminated and better packaged to identify gaps in the AIDS response and to shape HIV policy and programme decision making.

#### **Forge new paths to uphold human rights and address criminalisation, stigma, and discrimination**

A crucial lesson from the HIV epidemic (and for global health generally) is that the commitment expressed in universal human rights to enjoyment by everyone of the highest available standard of physical and mental health can be fulfilled. To uphold and defend the human rights of people with infections or people at most risk of infection can bring down the rates of infection and death. These lessons are still hard to learn and teach. Many people die when these lessons are not learned.

Practical solutions are needed to expedite changes in the laws, policies, and public attitudes that violate the human rights of vulnerable populations who might be at particular risk of HIV infection, such as women, sex workers, MSM, transgender people, injecting drug users, prisoners, and migrants. UNAIDS and its co-sponsors should redouble their efforts in this respect. Work at local level is key to increase inclusivity and community involvement. The creation of safe service havens for marginalised and vulnerable groups at high risk of HIV is a crucial step to ensure that no one is denied access to health care and HIV prevention.

#### **Reinforce and renew leadership and engagement of people living with HIV**

Renewed leadership and increased political commitment at the highest level—from heads of state and governments, parliaments, and other legislative bodies—must ensure that difficult policy choices are made and funding secured. Strengthening and expansion of the space for community responses to HIV and new ways to meaningfully involve affected populations in decision making on policy, implementation, and assessment are essential to increase the likelihood that national systems will develop in ways that are responsive to the needs of people living with and at risk of HIV. Reinvigoration of AIDS activism and civil society through dedicated investment and links with other groups, movements, and academia that actively promote health, gender equality, development, and human rights will help to build and sustain the political incentives important to drive meaningful action.

#### **Invest in research and innovation in all facets of the AIDS response**

Research must remain a core component of the AIDS response. The long-term goals of an effective vaccine and a cure remain priorities. Additional research priorities include: epidemiological studies to identify and monitor high-risk populations and hot spots; socio-behavioural research to understand the drivers and structural determinants of HIV transmission; and implementation research to improve the efficiency and effectiveness of interventions. Country-specific research on the common needs of people with HIV and people who have other diseases (eg, human resources, laboratory, pharmaceuticals, procurement distribution systems) are also necessary to eliminate parallel systems and to create synergies and efficiency gains. Ministries of health should consider establishing mentoring relationships with in-country academic centres, experienced non-governmental organisations, and the corporate sector. The evidence base on best-buy policy and programmatic interventions that deliver gains across several Sustainable Development Goals needs to be strengthened, and multi-sectoral coalitions should be built around these interventions.

#### **Promote more inclusive, coherent, and accountable governance for AIDS and health**

New alliances across sectors and more effective models for collaboration are required between HIV programmes and other sectors and constituencies that pursue shared goals. Mobilising action on the multi-sectoral structural determinants of health will need powerful advocacy, political will, and strong collective accountability. This Commission supports the establishment of a global multi-stakeholder, multi-sector platform to address the determinants of health and the assembly of an Independent Scientific Monitoring Panel on Global

Health to review and report on progress in addressing barriers to health equity, as proposed by the *Lancet*–University of Oslo Commission on Global Governance for Health.<sup>2</sup> Institutions must find workable solutions to secure the long-term supply of and access to the global public goods necessary to achieve equity in health, including disease surveillance systems and affordable, quality-assured drugs.

In conclusion, the question is no longer whether the fight against AIDS can be won; the only questions are: will it be won—and when? The answers to these questions will eventually depend on the decisions made by leaders and institutions at all different levels, in all sectors and parts of society, and on the personal choices people make in their private lives.

### Introduction

“After climbing a great hill, one only finds out that there are many more hills to climb.”

*Nelson Mandela*

Imagine a world where AIDS is no longer a threat to public health. Imagine the positive effect this would have on the health and wellbeing of individuals, families, communities, and economies. People born since 1980 have never known such a world, but those who are older remember it well. A world where AIDS is no longer a public health threat could once again become a reality.

Since the first reported cases of AIDS in 1981,<sup>3</sup> more than 78 million people have been infected with HIV, and 39 million have died of AIDS-related causes.<sup>4,5</sup> In the first 15 years of the AIDS epidemic, the virus claimed millions of lives and utterly devastated families and communities in countries of all income levels. Then, starting nearly 20 years ago, many people infected with HIV in high-income countries gained access to antiretroviral therapy (ART) and were no longer dying from AIDS. The opportunity to extend life-saving ART to people in low-income and middle-income countries came after the turn of the millennium. Investments made a huge difference. Continued scientific discovery and activism,

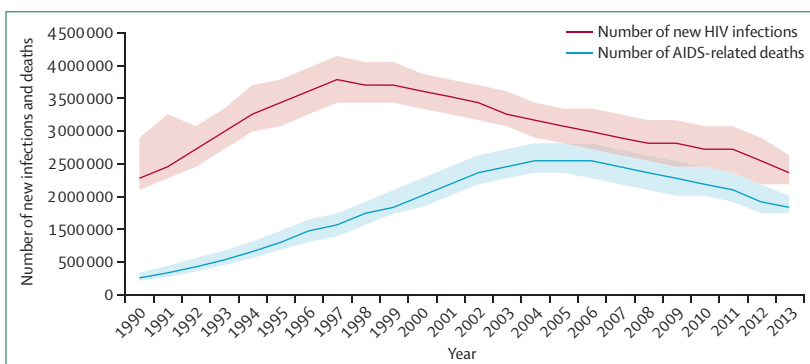
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along with resource mobilisation, political commitment, and implementation created a favourable trajectory over the past decade. Now there is a new opportunity: to end AIDS as a public health threat by 2030.

The UNAIDS–*Lancet* Commission was established in May, 2013, to determine what is possible to achieve in the next 15 years and to set out how to revitalise and transform the AIDS response to make the vision of a world where AIDS is no longer a public health threat a reality. A related objective was to investigate how the AIDS response should evolve in a new era of sustainable development, an era that will demand far greater integration across global health. In view of the interconnections and potential synergies across different sectors and rights-based movements, the path to epidemic control set out in this report—particularly its whole-of-society perspective—has the potential to ignite a larger and even broader response, one that will be fundamental to the achievement of ambitious Sustainable Development Goals.

This Commission brings together a diverse group of experts, young people, people living with HIV and affected communities, activists, and political leaders. The Commission met twice—first in Lilongwe, Malawi, on June 28–29, 2013, and then in London, UK, on Feb 13–14, 2014. Three working groups were formed to investigate what it would take to end AIDS as a public health threat by 2030 and to explore how the lessons from the AIDS response could inform the future AIDS response, global health, and sustainable development. An extensive consultative process gathered inputs from stakeholders in all regions of the world. Over 1000 participants took part in 22 regional, country, think-tank, youth, civil society, and virtual dialogues—including a Youth Online Review and a public call for comments through *The Lancet* website. Details of the working groups and the consultation process are included in the appendix.

Our work was also informed by the wealth of evidence and experience from the AIDS response. Our analyses build on existing AIDS-related commitments, goals, and targets,<sup>6</sup> UNAIDS publications,<sup>4,7–9</sup> presentations at the 20th International AIDS Conference in Melbourne, Australia in 2014,<sup>10</sup> recommendations of the Global Commission on HIV and the Law,<sup>11</sup> and the *aids2031* Consortium report.<sup>12</sup> We have considered the *Lancet* Commission on Investing in Health<sup>1</sup> and the *Lancet*–University of Oslo Commission on Global Governance for Health.<sup>2</sup> Findings from new modelling studies and analyses show the effects and costs of different patterns of scaling up key prevention and treatment interventions on future HIV trends in low-income and middle-income countries. A writing group collated all the information and drafted this report. Commissioners were provided the opportunity to comment on the draft, after which the writing team considered their suggestions and revised the report accordingly.



**Figure 1: Estimated global number of new HIV infections and deaths from AIDS, 1990–2013**  
Source: UNAIDS 2013 global fact sheet.<sup>13</sup> Shaded areas indicate uncertainty bounds.

In section 1 of this Commission, we make the case that HIV is still a major public health threat, present the most recent worldwide, regional, and national data, and highlight geographical hot spots and high-risk populations. In section 2, we summarise the evidence on biomedical, behavioural, and structural interventions (ie, what works) and lessons learned from the AIDS response. In section 3, we argue why the present is a win or lose moment in time and describe the urgent need for action. To this end we present four scenarios for scaling up these evidence-based interventions.

The rest of this Commission is devoted to a discussion of what it will take to win the fight against AIDS. In section 4, we call for better data collection and analysis of HIV in high-risk groups, greater community involvement, more tailored approaches to prevention and treatment, and smart integration of services. In section 5, we argue for increased investment across the entire range of HIV research topics. In section 6, we describe the need for greater synergies—at national and global levels—between the AIDS response and other efforts to improve health. In section 7, we look at returns on investment and how to secure long-term sustainable financing for comprehensive national AIDS responses. Finally, in section 8, we present our final conclusions and main recommendations.

### Section 1. HIV/AIDS today: still a major public health threat

Despite remarkable achievements in the past 30 years, HIV remains a major threat to public health. Although the latest available data and evidence show that the overall trend of HIV infection is generally decreasing, too many people are becoming newly infected with HIV, too many people do not know that they have HIV, and too many people are dying from AIDS-related causes. This is particularly true in major parts of sub-Saharan Africa and in various populations at high risk of HIV. With still more new HIV infections each year than patients who start ART, the AIDS response appears to be running to a standstill. This section presents a snapshot of HIV/AIDS today, using data mostly generated by UNAIDS.

#### Impressive achievements but much more to be done

New HIV infections have been decreasing worldwide since 1996, before the availability of ART. From 2001 to 2013, annual incidence of HIV infections decreased by 38%, from 3.4 million in 2001 to 2.1 million in 2013 (figure 1).<sup>4</sup> From 2002 to 2013, the annual incidence of HIV infections in children decreased by 58%, with 240 000 new infections in 2013 compared with 580 000 in 2002.<sup>4</sup> In some parts of the world, mother-to-child transmission of HIV has been virtually eliminated.<sup>14</sup> With increased access to ART (figure 2), AIDS-related deaths decreased by 35% between 2005 (when the highest number of deaths was recorded) and 2013. In South Africa, one of the countries most ravaged by

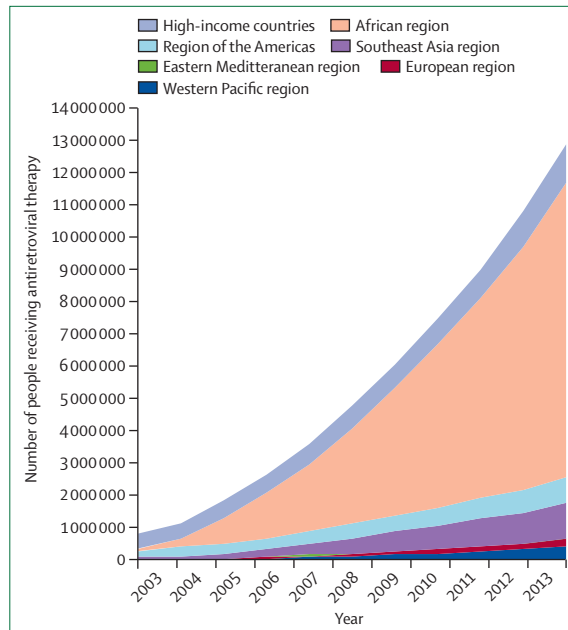


Figure 2: Number of people receiving antiretroviral therapy, by WHO region, 2003–13

Source: Global AIDS response progress reporting 2015.<sup>15</sup>

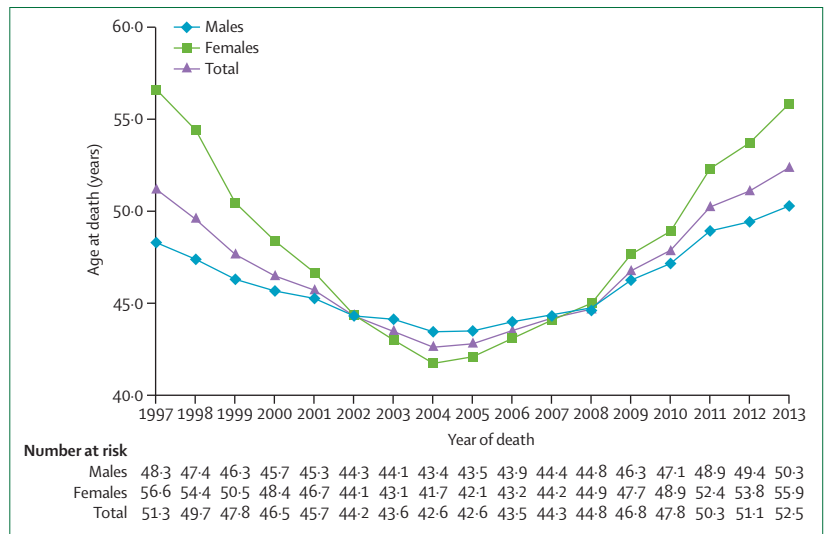


Figure 3: Median age at death, South Africa, 1997–2013

Source: Statistics South Africa 2014. <http://beta2.statssa.gov.za/>.<sup>16</sup>

HIV/AIDS, mean life expectancy rose in 2005 for the first time since 1997, surpassing 50 years in 2011 for the first time since 1997 (figure 3).

This progress aside, 1.5 million people died of AIDS-related causes in 2013, more than 10 million people had yet to initiate ART according to current WHO treatment guidelines, and an estimated 19 million of the 35 million people living with HIV did not know they were infected with the virus.<sup>4</sup> In 19 countries within sub-Saharan Africa and in Haiti, HIV/AIDS is the



number one cause of years-of-life lost, and HIV/AIDS ranks as the sixth leading cause of years-of-life lost worldwide.<sup>17</sup>

An estimated 2.1 million people were newly infected with HIV in 2013.<sup>4</sup> People living in 15 countries (Brazil, Cameroon, China, India, Indonesia, Kenya, Mozambique, Nigeria, Russia, South Africa, Uganda, Tanzania, the USA, Zambia, and Zimbabwe) accounted for more than 75% of these new infections.<sup>4</sup> In every region of the world there are a few countries that bear the burden of the epidemic. Within sub-Saharan Africa, people living in Nigeria, South Africa, and Uganda account for nearly half of all new HIV infections.<sup>4</sup> In eastern Europe and central Asia, about 90% of the people acquiring HIV infection live in Russia and Ukraine, while people living in the Dominican Republic, Haiti, and Jamaica together account for all but 2% of new HIV infections in the Caribbean.<sup>18</sup>

Six countries—the Central African Republic, the Democratic Republic of the Congo, Indonesia, Nigeria, Russia, and South Sudan—are facing the triple threat of high HIV burden, low treatment coverage, and no or little decrease in HIV infections.<sup>4</sup>

The number of new HIV infections are rising in some countries in Europe, Asia and the Pacific, the Middle East, and north Africa. In Indonesia, for example, incidence rose by 48% between 2005 and 2013.<sup>4</sup> In South Africa, an estimated 6.4 million people live with HIV, about 2.6 million (42%) of whom had initiated ART by 2013, a doubling in treatment levels since 2008, making this the largest HIV treatment programme in the world.<sup>4</sup> Despite this substantial increase in HIV testing and treatment, national HIV prevalence in pregnant women has remained within a narrow range of 29.1–30.2% in

each of the 9 years up to the last available estimate in 2012.<sup>19</sup> Underpinning this apparently stable prevalence is a complex interplay between falling death rates in HIV-infected individuals and decreasing HIV incidence rates, thereby creating the illusion of an unchanging epidemic when only the numbers of infected individuals are considered. Despite the encouraging downward trend in the number of new HIV infections, South Africa continues to have unacceptably high incidence rates of more than 1000 new HIV infections each day, about 400 000 new infections per year.<sup>20</sup> These continued high rates of new infections threaten to undermine the country's treatment gains.

A few countries are backtracking. In Uganda, for example, the annual number of new HIV infections dropped from 170 000 in 1990 to 90 000 cases in 1999 before rising again to reach 170 000 in 2011, partly because of very high population growth in the country, partly because of a rebound in HIV incidence.<sup>21</sup>

### Hot spots and high-risk populations

Global and regional data camouflage localities where the HIV epidemic is continuing to grow unabated: there are many different micro-epidemics, and the risk of acquiring HIV and dying from AIDS is not evenly distributed across society. The HIV epidemic tends to be concentrated in certain geographical areas (hot spots) where the prevalence of HIV infection is much higher than it is elsewhere. In 13 of 33 countries in sub-Saharan Africa, the prevalence of HIV infection in adults varies at least by a factor of five, depending on the province or state. In Kenya, for example, prevalence of HIV infection varies from 2.1% in the Eastern North Province to 4.9% in Nairobi and 15.1% in Nyanza.<sup>22</sup> There are

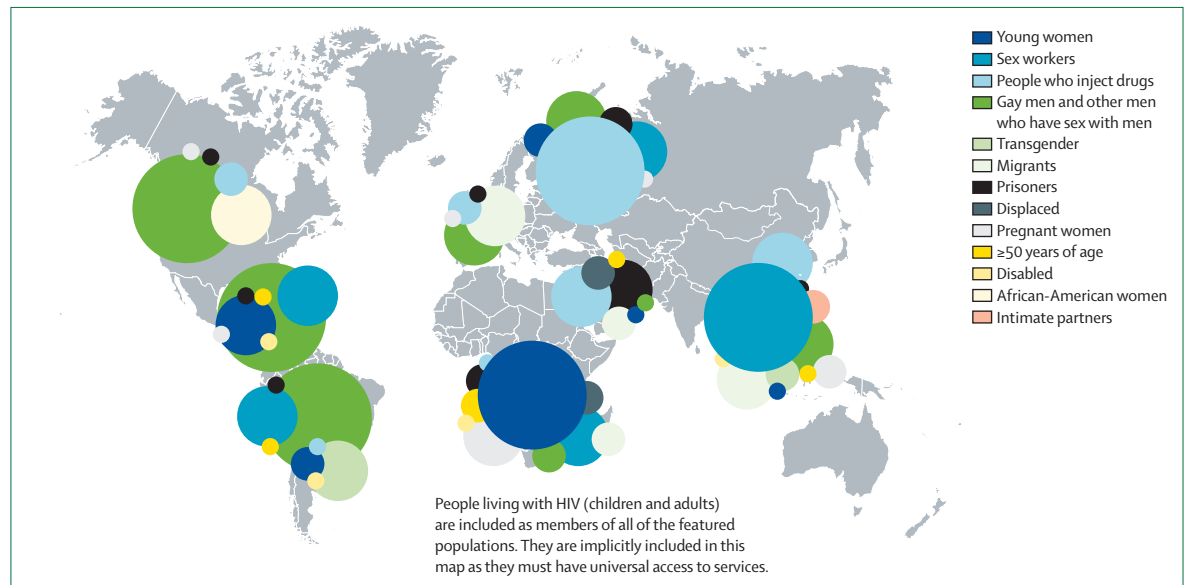


Figure 4: The importance of location and population  
Source: The Gap Report.<sup>4</sup>

disproportionate differences in vulnerabilities to HIV between ethnic groups within countries. For example, African Americans account for an estimated 44% of people with new HIV infections in the USA, despite representing only 13% of the population.<sup>23</sup> The HIV epidemic is increasingly clustering within urban areas. The number of people living with HIV in the city of Durban, South Africa, alone (>600 000) is similar to the number of people living with HIV in the whole of Brazil.<sup>24</sup>

In addition to sub-national geographical variations, in most countries, HIV incidence and prevalence and AIDS-related mortality are much higher in specific populations than in the general population. These high-risk populations include, among others adolescent girls and young women in southern and eastern Africa, sex workers, men who have sex with men (MSM), transgender people, injecting drug users, prisoners, and migrants (figure 4).

In all countries, adolescents and young people are heavily affected, accounting for 39% of all new infections in 2012 and 15% of all people living with HIV.<sup>25</sup> While the total number of AIDS-related deaths in all age groups fell by 35% between 2005 and 2013, AIDS-related deaths in adolescents increased by 50%.

Adolescent girls and young women in southern and eastern Africa are at the centre of the epidemic, for whom the prevalence of HIV infection is as much as a five times higher<sup>19</sup> and age of infection about 5–7 years earlier<sup>26,27</sup> than their male counterparts. Data from South Africa in 2012 show that in young women aged 15–24 years, incidence was more than four times higher than men in this age group (2.5% vs 0.6%). Black South African women age 20–34 years had the highest incidence of HIV, with a rate of 4.5%. The prevalence of HIV infection in women age 30–34 years is 36% (figure 5).

Intimate partner violence, abuse, and exploitation of adolescent girls and young women increases their risk and susceptibility to HIV infection. In 2014, UNAIDS published a collection of essays<sup>29</sup> written by women living with and affected by HIV about their experiences of violence by intimate partners and of health-care institutions. In some settings, up to 45% of adolescent girls report that their first sexual experience was forced; young women who experience intimate partner violence are 50% more likely to acquire HIV than women who have not,<sup>30,31</sup> and young women are more likely to experience gender-based violence than older women.<sup>32</sup> Fear of violence can also affect whether or not a woman feels able to use counselling and testing services.<sup>33</sup> Findings from studies done in Kenya,<sup>34</sup> South Africa,<sup>35,36</sup> Tanzania,<sup>37</sup> and Zimbabwe<sup>38</sup> showed that women living with HIV had consistently higher rates of intimate partner violence.

Other important drivers of the HIV epidemic in young women are an unawareness of their HIV status, scarce knowledge about HIV, and failure to use a condom during sex. Among girls aged 15–19 years who

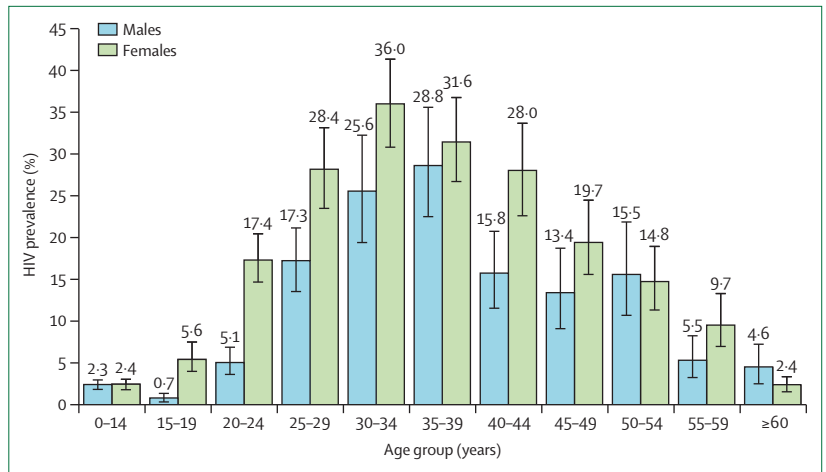


Figure 5: HIV prevalence by age and sex in South Africa, 2012

Source: South African national HIV Prevalence, Incidence and Behaviour Survey, 2012.<sup>28</sup>

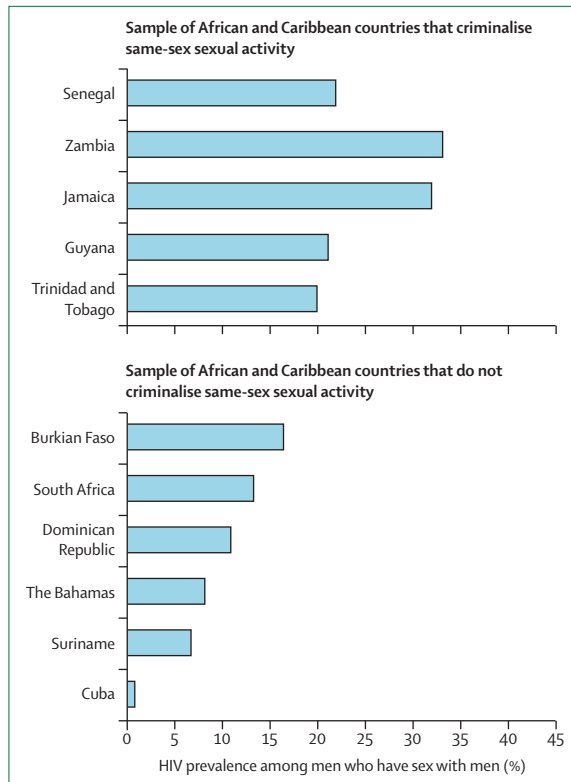
reported having multiple sexual partners in the past 12 months, only 36% said they used a condom the last time they had sex.<sup>4</sup>

#### Sex workers

In 110 countries with available data, the prevalence of HIV infection is almost 12 times higher among sex workers than in the population as a whole, with HIV prevalence among sex workers upwards of 45% in Botswana, Rwanda, Swaziland, and Zimbabwe.<sup>4</sup> However, it is important to note that this global average masks the fact that in some countries, including most of western Europe, HIV prevalence among sex workers is very low. Median prevalence of HIV infection in sex workers in sub-Saharan Africa is 20.5% compared with the global median of 3.9%. No African country reports a prevalence of HIV infection of less than 6% among sex workers. Prevalence of HIV infection in sex workers also remains high in parts of the Caribbean. Data indicate that 8.4% of female sex workers living in Haiti have HIV.<sup>4</sup> In 2012, 14% of male sex workers from 27 countries had HIV.<sup>4</sup>

Violence, criminalisation, stigma and discrimination, and the scarcity of programmes and funding are the four main reasons why sex workers are being left behind in the AIDS response.<sup>4</sup> Discrimination against sex workers is nearly universal. The combination of HIV-related stigma and stigma associated with sex work prevents sex workers from seeking HIV testing, and sex workers are also less likely to receive treatment. For example, 15% of female sex workers in Togo who had been diagnosed with HIV were being treated in 2013, as opposed to 50% of the general adult population.<sup>18</sup>

Many countries retain laws that criminalise sex work,<sup>39</sup> and there is strong evidence that the criminalisation of sex work encourages behaviour associated with a high risk of HIV infections and other sexually transmitted infection.<sup>40</sup> Where sex work is criminalised, violence against sex workers is often not reported or monitored,



**Figure 6: The effect of criminalisation of same-sex sexual activity on HIV prevalence in selected countries**  
 Source: Global Commission on HIV and the Law: risks, rights & health.<sup>11</sup>

and legal protection is often not offered to victims of such violence.<sup>4</sup> Health-service providers often neglect their duty to provide care when attending to sex workers.<sup>4</sup> Only about one-third of countries have HIV risk-reduction programmes for sex workers, and these programmes tend to vary in quality and reach.

#### MSM

Results of a meta-analysis published in 2013 showed that MSM in low-income and middle-income countries were about 19 times more likely to have HIV than the general population.<sup>41</sup> In Latin American countries, MSM are up to 33 times more likely to have HIV than men in the general population.<sup>42</sup> In Senegal, the prevalence of HIV infection is about 1% in the general population, whereas the prevalence is estimated at 22% among MSM. In Jamaica, the prevalence of HIV infection is about 1.7% in the general population, but estimated at 37.6% among MSM.<sup>43</sup>

Incidence of HIV infection among MSM is rising in several parts of the world, including cities in North America, Europe, Asia, and Australia. In the UK, there has been a steady increase in the number of new infections among MSM to 3250 in 2013, now representing more than 50% of all new infections, whereas the number of diagnosis in heterosexuals

decreased. Most new cases of HIV infection are concentrated in London, with 1600 cases reported in 2012.<sup>44</sup> In Australia, where most new cases of HIV infection are from sexual contact between men, 1253 new HIV infections were diagnosed in 2013, a 10% rise compared with the previous year.<sup>45</sup> In Poland, the incidence of HIV infection rose 13.5-times among MSM between 2000 and 2011 (incidence was highest in the Warsaw region), and the most substantial increase in incidence was among MSM aged 25–44 years.<sup>46</sup> A 2014 study by the US Centers for Disease Control and Prevention (CDC) reported a 132.5% rise in annual diagnoses of HIV infection among young MSM (aged 13–24 years) in the USA between 2001 and 2011.<sup>47</sup>

In many American and European cities, HIV incidence in gay men remains high or is increasing, despite an increasingly open and tolerant attitude towards homosexuality, but in a context of decreasing attention to HIV prevention, both at government level and by affected individuals. However, same-sex activity is a criminal offence in 78 countries, with penalties ranging from whipping to execution.<sup>48</sup> In these countries, there is increased fear and hiding, decreased provision and uptake of HIV prevention services, and decreased uptake of HIV care and treatment services.<sup>49</sup> According to estimations,<sup>50</sup> more than 90% of MSM in the Asia-Pacific region do not have access to HIV prevention and treatment services. Figure 6 highlights how criminalisation can negatively affect HIV transmission. In Caribbean countries where homosexuality is criminalised, 25% of MSM are reported to be infected with HIV, whereas the rates are much lower in countries that do not criminalise homosexuality.<sup>11</sup> In many countries, even ones that do not criminalise homosexuality, stigma and discrimination restrict MSM's access to services.

#### Injecting drug users

The incidence of HIV infection can be very low among injecting drug users when harm-reduction programmes are fully implemented. However, in some countries that have not translated this evidence into policy and practice, more than 80% of all HIV infections are related to drug use.<sup>51</sup> In Russia, for example, the evidence on the effectiveness of harm reduction and opioid substitution therapy services for injecting drug users is still denied, and services that previously existed have been stopped. As a result, the rates of HIV infection among injecting drug users in Russia are amongst the highest in the world.<sup>2</sup>

Authors of the *World Drug Report 2014*<sup>51</sup> estimate that 1.7 million (13%) of the 12.7 million injecting drug users worldwide are living with HIV. The prevalence of HIV infection among injecting drug users is at least 22 times higher than in the population as a whole and at least 50 times higher in 11 countries.<sup>52</sup> In Indonesia, 36% of injecting drug users are living with HIV compared with 0.4% of the general adult population.<sup>53</sup> Data suggest that



the HIV epidemics is expanding among injecting drug users in southeast Asia and the Pacific, eastern Europe, and central Asia.<sup>2</sup> Non-injection drugs and alcohol consumption also drive HIV transmission. In the UK, rising rates of HIV infection have been linked to so-called chemsex (sex under the influence of crystal methamphetamine, gamma-hydroxybutyric acid/gamma-butyrolactone, and mephedrone), which is reported to hamper the negotiation of safe sex.<sup>54</sup>

In many countries, injecting drug users are at much higher risk of HIV than the general population and are often discriminated against and excluded from HIV care and prevention services. Injecting drug users continue to face punitive legal environments, a variety of human rights abuses, and have poor access to services; these and other factors combined exacerbate their risks of acquiring HIV. In various parts of the world, the possession of clean syringes can be used as evidence to prosecute injecting drug users or provide grounds for police harassment, thereby deterring safe injecting practices. Five out of six of the world's drug users do not have access to evidence-informed programmes focusing on prevention, treatment, social rehabilitation, and integration.<sup>51</sup>

#### *Other at-risk populations*

Transgender women are more likely to acquire HIV than most adults of reproductive age, and 19% of transgender women are estimated to be living with HIV (the effect of HIV on transgender men has yet to be established). Transgender women who sell sex and inject drugs are at an even greater risk of acquiring HIV. Transgender people often face stigma and ill treatment, including refusal of care, harassment, verbal abuse, and violence. Despite evidence of heightened HIV risk, the coverage of HIV prevention programmes among transgender people remains poor across all regions.

Around the world, prisoners have higher rates of HIV infection, partly because of the criminalisation of high-risk behaviours (eg, injecting drug use and sex work) and because of high-risk behaviour within prisons (eg, unprotected anal sex, sexual violence). Adequate health services, including HIV services, are often unavailable, mandatory HIV testing is common, and many prisoners with HIV have no confidentiality or privacy regarding their HIV infection status.

Risk of HIV infection among some, but not all, migrants is increased by separation from families and familiar social and cultural norms, substandard living conditions, exploitative working conditions, and inadequate access to services. The immigration policies and practices of some countries exacerbate these risks. Many countries still restrict people living with HIV from entering or remaining in a country for any purpose. Where HIV testing occurs in the context of migration, internationally agreed standards for informed consent, confidentiality, and counselling are not routinely applied.<sup>55</sup>

The many reasons why certain groups are more vulnerable to HIV infection vary widely between countries and between communities; the reasons are rarely linear or singular. High-risk sexual behaviour might play a part, but the reasons often stem from stigma, human rights violations, gender inequality, violence against women, criminalisation, inappropriate legislation and policies, and poor leadership and political courage, all of which prevent access to HIV services. In some environments, poverty and restricted livelihood options drive the epidemic; elsewhere, HIV transmission is higher in wealthier segments of society. Each country needs a detailed analysis of its at-risk populations and hot spots.

## **Section 2. What works: evidence and lessons from the AIDS response**

Increasingly compelling evidence suggests that certain combinations of biomedical and behavioural prevention measures can successfully reduce AIDS-related mortality, new HIV infections, and mother-to-child transmission to very low levels and that these combinations can be implemented on a large scale in a cost-effective manner.<sup>56</sup> Moreover, evidence is mounting of the power of prevention and treatment united with political, social, and structural interventions. Interventions that promote economic security, social justice, and the transformation of gender relations, for example, can be linked to improved adherence to HIV treatment, reduced mortality, and lower rates of new infections.

Community mobilisation, behavioural change, and condom use in gay communities in North America, western Europe, Australia, and Brazil were the first interventions to successfully prevent HIV—even in the absence of biomedical interventions or effective therapy—and remain essential core components of any effective AIDS response.<sup>57</sup> The scientific data showed beneficial effects of the 100% Condom Use programme in Thailand (a campaign urging men to use a condom at every commercial sex encounter) and the ABC mass education campaign in Uganda (abstinence, be faithful, and use a condom if A and B fail). Similarly, evidence from harm-reduction programmes in several countries, including Australia and the UK,<sup>58</sup> established needle exchange as a component for HIV prevention among injecting drug users. As a result of these early HIV prevention interventions, worldwide HIV incidence began to decrease in 1997, well before many people living with HIV had access to ART.

The first biomedical strategy to prevent sexual transmission of HIV—voluntary medical male circumcision—was tested in three trials between 2005 and 2007 in Kenya,<sup>59</sup> South Africa,<sup>60</sup> and Uganda.<sup>61</sup> The results showed that male circumcision reduced HIV acquisition in men by 50%. Since 2008, the scale-up of voluntary medical male circumcision has involved 5·8 million men from the 14 African countries with the highest

prevalence of HIV infection choosing circumcision for HIV prevention.<sup>62</sup>

The finding in the late 1990s that a combination of three ARTs was a highly efficacious HIV treatment revolutionised both the lives of people living with HIV and the perception of the epidemic, and remains the basis of HIV treatment. Since 2010, a series of studies have shown that ARTs as pre-exposure prophylaxis are effective in preventing sexual HIV transmission when used either topically by women<sup>63</sup> or orally by discordant couples,<sup>64</sup> MSM,<sup>65</sup> or heterosexual men and women, as long as individuals took the medication; however, not all studies showed protection.<sup>66</sup> Similar results were also found in injecting drug users.<sup>67</sup> In 2011, options for HIV prevention were greatly improved when treatment with combination ARTs, with sufficiently high levels of adherence to suppress viral load in HIV infected individuals, reduced the transmission of HIV to their sexual partners by 96% in stable couples.<sup>68</sup> The benefits of ART to both people living with HIV and their HIV-negative sexual partners provide further impetus to increase treatment coverage and initiate treatment earlier.

The use of ART (initially AZT<sup>69</sup> and, later, nevirapine<sup>70</sup>) for HIV-positive pregnant women have reduced mother-to-child transmission of HIV to the point where the elimination of new HIV infections among children has become an ambitious global plan.<sup>71</sup> The scale-up of prevention of mother-to-child transmission has been enhanced by the availability of rapid, point-of-care HIV tests. Much has been learned about how to make these interventions acceptable to women. There is a need to commit to incorporate prevention of mother-to-child transmission in antenatal and maternal care where women and infants are at risk and to support women in caring for their own health and that of their children. The appendix describes essential components of prevention of mother-to-child transmission.

### Structural interventions for successful HIV prevention and treatment

Structural factors are increasingly recognised as key to the AIDS response. The STRIVE research consortium, for example, has been investigating the social norms and inequalities that drive HIV. Another example is the People Living with HIV Stigma Index, which measures trends in stigma and discrimination towards people living with HIV. Below we summarise the evidence in five broad areas: women's and girls' economic and social empowerment; gender norms, masculinity, femininity, and violence; stigma, discrimination, and criminalisation; poverty and scarce economic opportunities; and alcohol availability, drinking norms, and drug consumption.

Completion of secondary education reduces vulnerability against HIV infection, with evidence showing that girls who remain in school are less likely to be HIV infected.<sup>72</sup> Education has been described as a key so-called

social vaccine against HIV. Examples of successful interventions include a conditional cash transfer intervention in Malawi to pay girls varying amounts of money to stay in or return to school.<sup>73</sup> Results of the study<sup>73</sup> showed that after 18 months, girls in the cash group were 60% less likely to be HIV infected. Girls' and women's vulnerability to HIV is often compounded by restricted access to information about how to protect themselves from HIV and their ability to negotiate condom use in unequal relationships. Discriminatory laws that present obstacles to women's rights, including their sexual and reproductive rights, must be revoked to reduce new HIV infections, AIDS-related deaths, and gender-based violence. Removal of mandatory parental or spousal consent requirements for accessing health and HIV services is especially important.

Several programmes have targeted gender inequality, unhealthy constructions of masculinity and femininity, and violence against women and girls. Authors of a review of effective prevention<sup>74</sup> reported that the most promising approaches are multifaceted: working with men and women, boys and girls, and engaging with multiple stakeholders. Such interventions can have potential HIV prevention benefits. For example, results of a randomised controlled trial of the Stepping Stones intervention in South Africa to assessing the effect of gender-based violence prevention programmes<sup>75</sup> showed that they had an effect on the incidence of Herpes simplex virus type 2, but no direct effect on HIV infection. Findings from the SHARE trial in Uganda<sup>76</sup> revealed that violence prevention activities and strengthened violence intervention counselling, when integrated into an enhanced antiretroviral therapy delivery programme, had a great effect on HIV incidence.

Violence prevention and HIV programming can have potential benefits when integrated into existing development platforms, such as microfinance, social protection, and education, which would greatly facilitate scalability and sustainability. A case in point is the IMAGE study,<sup>77</sup> which assessed the effect of a group-based empowerment model integrated with an existing micro-credit scheme that gave small loans and business training to poor women in rural South Africa. In addition to a 55% reduction in partner violence, this approach improved social capital, household economic wellbeing, and women's agency.

Community mobilisation interventions can also provide a means to change behaviour associated with high risk of HIV infection. For example, results of a randomised controlled trial to assess the ability of a community mobilisation intervention to prevent intimate partner violence and promote gender equity showed promising community-level effects on the levels of physical violence that women experienced from their partners and also positively affected HIV-related risk behaviours and relationship dynamics, particularly between men.<sup>78</sup>

For the STRIVE research consortium see <http://strive.lshtm.ac.uk/>

For the Stigma Index see <http://www.stigmaindex.org/>

Strides have been made to reduce HIV related discrimination through legislation, successful stigma-reduction programme models,<sup>79</sup> and adaptation of exercises and curricula for a diverse range of audiences.<sup>80</sup> For example, exposure to so-called edutainment programmes in Botswana and Kyrgyzstan correlates with more accepting attitudes, but not in Malawi. Several community-based interventions in Thailand, Tanzania, Vietnam, and Zambia have also substantially reduced the levels of stigma.<sup>79</sup>

Stigma is often multi-layered, and can strongly interface with other structural drivers, such as gender inequality, poverty, human rights violations, and violence. This is particularly evident for marginalised groups. For both generalised and concentrated HIV epidemics, decriminalisation of sex work and of same-sex relations could avert incident infections through combined effects on violence, police harassment, safer work environments, and HIV transmission pathways. As for injecting drug users, there is evidence that decriminalisation of injecting drug use and laws to allow syringe exchange are effective strategies to reduce HIV transmission rates.<sup>81,82</sup>

With higher incomes and access to social protection benefits, people living with HIV are more resilient and can continue lifelong treatment. Social protection programmes have also been shown to reduce the disadvantages that put people at high risk of HIV infection in the first place, help overcome barriers to HIV prevention and treatment, and mitigate the overall effect of HIV on households.<sup>83</sup> Successful programmes include HIV-specific social protection strategies and broader social protection programmes.

Findings from research from industrialised countries suggests that alcohol pricing and taxation policies can reduce the negative consequences of alcohol consumption on risk of HIV infection,<sup>84</sup> although only few assessments from developing countries are available.<sup>85</sup> Although evidence to suggest that there are causal pathways between alcohol, sex, and HIV is growing, this evidence remains equivocal.<sup>76</sup>

#### **Lessons from the AIDS response: strengths and weaknesses**

The 34-year fight against AIDS has been an unprecedented response to an unprecedented health threat. Moreover, the AIDS response has generated global health—a term that emerged at the time of the millennium change—and helped to galvanise efforts in health more broadly, notably in the case of tuberculosis and malaria.<sup>86</sup> The AIDS response has highlighted and helped to alleviate health-system deficiencies, including the ongoing crisis in human resources for health.

The achievements of the global AIDS community were driven by a confluence of interconnected factors that are as relevant today as ever, including: activism and the leadership and engagement of civil society and communities; political leadership; multi-stakeholder partnerships and multi-sectoral collaboration; a response

grounded in scientific evidence and innovation; human rights frameworks and instruments to accelerate progress; a step change in financing from millions to billions of dollars; and global and local monitoring and accountability systems.

Many of these success factors are now also prominent in other global health initiatives, including those aimed at improving women's and children's health, and are relevant to many other development priorities. Therefore, the lessons are important opportunities, not only for a reinvigorated AIDS response but also for the wider global health communities. We will briefly summarise the lessons and specific shortcomings of the AIDS response that need to be overcome to achieve epidemic control.

#### *Activism and the leadership and engagement of civil society and people living with HIV*

Activism by people living with HIV is a defining feature of the AIDS response that set it apart from responses to other health challenges. Activism spans all facets of the response, from science, to invoking the right to health, to challenging trade policy, and to adopting rights-based service approaches. National and transnational activism has played and continues to play an important part in advocacy for setting agendas, generating responsive policy, ensuring services for hard-to-reach populations, mobilising communities, particularly marginalised ones, and strengthening community systems. It was the fuel from activism that drove price reductions of ARTs, and the reinterpretation of the international TRIPS agreement resulted in wide spread availability of generic medicines. Yet the most important contributions of activism might have been the creation of incentives for political leaders to take difficult and risky decisions, in generating public support for those decisions, and in holding leaders and service providers to account for how resources, commitments, and services are delivered.

#### *Multi-stakeholder partnerships and multi-sectoral collaboration*

Governments have the ultimate responsibility for coordinating HIV issues. In many countries, National AIDS commissions or councils were tasked with the coordination and facilitation across sectors, often with leadership at the highest levels of government. The internationally agreed Three Ones developed by UNAIDS aimed to align efforts of diverse actors around the leadership of one national authority in support of one national strategy, monitored through one national monitoring framework. Although the Three Ones did facilitate multi-stakeholder action, it also showed how donor priorities and reporting requirements are not easily aligned for a shared purpose simply by the logic of a soft agreement if the national coordinating body is not empowered by a clear mandate and authority. In terms of stakeholders in the AIDS response, operations of the Global Fund to Fight AIDS, Tuberculosis and Malaria (the Global Fund) added further complexity, but also a

new opportunity for multi-sector and multi-stakeholder country-level response. UNAIDS is itself innovative in being specifically tasked to mobilise and support the capacity and resources of both governments and non-state actors in the response. Just as the Global Fund, UNAIDS is governed by a Board with government and non-government representation and, uniquely, unites several UN agencies active in the response.

### *Political leadership*

Political leadership, including parliamentary leadership, can make or break any societal action, including the response to AIDS, and is fundamental to a long-term sustainable AIDS response. The AIDS response has been noteworthy for the range of outstanding political leaders who have used their positions when in power—or reputations after they left office—to champion effective action on HIV, including specific funding mechanisms such as the Global Fund and US President's Emergency Plan for AIDS Relief (PEPFAR). Early political action by visionary presidents and prime ministers helped prevent these countries from developing substantial HIV epidemics. Other countries suffered devastating effects from the epidemic as a result of misguided political leaders and inadequate or even regressive AIDS responses. Parliamentary AIDS Committees have been extremely important, but many are now dormant. Countries that have been identified as success stories have not all maintained that reputation, overall or in respect of some of their sub-populations. Hard-won gains can quickly begin to unravel when new political agendas steer responses in counter-productive and damaging directions.

### *A response grounded in scientific evidence and innovation*

Scientific breakthroughs and innovation in all facets of the response, and the generation and use of evidence and data have been and will continue to be essential to the success of the AIDS response. In addition, health-system adaptations (eg, standardising first-line regimens, fixed-dose combinations) and innovations (eg, peer-support for treatment, task-shifting, community mobilisation) have provided important lessons on how health services can sustainably reach ever increasing numbers of patients with ART. Indeed, these lessons are being used by the health services in chronic disease care (eg, diabetes and hypertension).

### *Human rights frameworks and instruments*

The AIDS movement has triggered growing recognition of and attention to the right to health,<sup>87</sup> as evidenced through the term's increasing appearance in national constitutions, the growing use of strategic litigation on the right to health, and the appointment of a UN Special Rapporteur on the right to the highest attainable standard of physical and mental health in 2002.<sup>88</sup> In addition to the inclusion of the right to health in several constitutions,

such as in Brazil and South Africa, HIV has been unusual among health issues in the extent to which the law has become formally involved in protecting and promoting the human rights of people affected by the epidemic. The AIDS response has shown the efficacy of domestic judicial systems for enforcement, as demonstrated by strategic litigation and the training of law enforcement officials, also enabling people living with HIV to know and claim their rights.<sup>89</sup> Indeed, more than half of all court cases challenging governments in low-income and middle-income countries on the right to health have been invoked in relation to HIV/AIDS. Such strategic litigation for the right to health set the stage for the broader judicialisation of health-related rights.<sup>90</sup>

### *From millions to billions of dollars in financing*

An extraordinary dynamic of the HIV response has been the substantial mobilisation of resources characterised by a rapid, and unprecedented, scale-up of contributions from external partners—a development now being mirrored by substantially increasing investments from domestic governments. At the outset, traditional sources of development assistance were used, but over time, increasingly innovative and diverse approaches have been created, such as the Global Fund and PEPFAR. Innovation in programming has been matched by growing emphasis on achieving the greatest efficiencies by investing resources behind the programmes. Such shifts in prioritisation indicate the adaptive quality of many stakeholders in the HIV response.

### *Global and local monitoring and accountability*

The AIDS response pioneered rigorous monitoring of a broad set of indicators. This kind of tracking and then publishing by UNAIDS and other organisations has been a crucial way to hold leaders, institutions, and governments accountable and to adjust AIDS responses.

### *Crucial weaknesses of the AIDS response*

The AIDS response has been captive to short-term funding cycles and short-term programmatic goals. The funding cycles of most donor organisations do not allow for long-term planning or for interventions that take longer to provide results. Strategies with longer time frames are needed to create an ultimate and sustainable effect on life-long treatment, life-long prevention, and the structural drivers of the epidemic.<sup>12</sup>

Although the AIDS response has many good practices, coordination between international institutions and, particularly, harmonisation with national agendas and structures involved in managing the AIDS response has often been poor. Strategies and coordinating mechanisms are still duplicated, and there are still multiple frameworks and different reporting mechanisms at the country level. The biggest challenges in harmonising the response have been evaluation reporting, the creation of parallel structures, and

disparities in workforce compensation. These weaknesses are pervasive across global health enterprise and not unique to the AIDS response.

Whereas the price of first-line ART to treat HIV is at an all-time low, supply of generic drugs is at risk, and many second-line and third-line ARTs remain prohibitively expensive, as do treatments for drug-resistant tuberculosis, hepatitis C, and many opportunistic infections. Point-of-care viral-load tests are also too expensive to meet demand. Too often, the priority in the AIDS response has been to increase the number of people initiating ART, and little attention has been paid to the quality of care provided to people living with HIV and their retention in care and adherence to treatment. The consequences can be dire—unsuppressed viral load leading to continuing spread of HIV and drug-resistant viruses.

Overall, provision of large scale, effective HIV prevention interventions has failed, and prevention of new infections has therefore also failed. With funding for prevention lagging behind treatment programmes, fewer than one in five people at risk of HIV infection today have access to prevention programmes.

There has been an overreliance on a biomedical approach alone to the HIV epidemic. Approaches that seek to address the underlying structural and root causes of the epidemic are less promoted. Deliberate and targeted efforts to reduce the devastating effect of stigma, gender-based violence, discrimination, and inappropriate legal and policy environments are needed. Furthermore, a poor understanding of the structural determinants of the epidemic can also undermine the success of biomedical approaches.

The urgent nature of the AIDS response and the need to rapidly implement interventions to prevent mortality and morbidity led to some inefficiencies and ineffective use of resources. While inefficiencies in the early days of the AIDS response were understandable, not enough has been done to address them since, limiting the ability to maximise synergies, to make the most out of available resources, and to concentrate external resources on where the epidemics are. The AIDS response has not always adequately applied standard managerial and programmatic strategies to contain costs and reduce duplication. Examples of corruption and the misappropriation of funds include irregularities in the procurement and distribution of medical drugs; the sale of counterfeit drugs; and the occasional diversion of funds by ministries and national AIDS councils, companies, and individuals.

At the beginning of the AIDS response, it was important to have parallel systems for delivery and advocacy to get attention, funds, and action for HIV/AIDS. Today, however, smart integration is needed to move forward. The infrastructure developed for HIV/AIDS could help to address other health issues and has the potential to address patients' multiple needs.

The future AIDS response must rapidly scale up the full spectrum of available interventions to prevent and treat HIV, and it must consider how to further advance what has worked well and how to remedy what has not.

### Section 3. Win or lose: the AIDS response at a crossroads

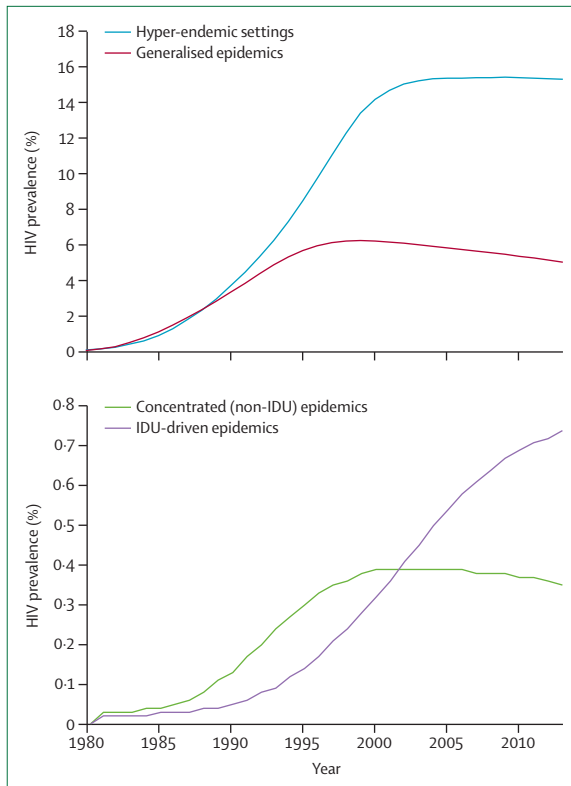
This section presents our analysis of the effect and costs of four scenarios for what is possible to achieve in an AIDS response: a highly ambitious scenario agreed at the UN in 2014 that would bring the HIV epidemic to a very low level (Global Goals); two scenarios that would progress epidemic control (Best Case, Financial Constraints); and one scenario—in which current, already considerable efforts, are maintained—that would stagnate progress and allow a rise in the rate of new infections beyond the 2·1 million new infections per year worldwide at present (Current Efforts). Additional funding must be substantial to meet the costs of HIV programmes until 2030. In many countries, these additional funds are unlikely to come from economic growth alone, so countries will have to generate more of their own domestic funding, and some countries will need external assistance to close the gap.

#### Four scenarios for what is possible to achieve in the AIDS response

We analysed the effects of different patterns of scale-up of prevention and treatment programmes on the future course of the HIV epidemic in low-income and middle-income countries, stratified by four different epidemic categories: hyper-endemic countries, generalised epidemics, injecting drug use (IDU)-driven epidemics, and concentrated epidemics (not IDU-driven). These four categories were chosen to show the effect of prevention and treatment programmes in different epidemic conditions. We determined the demographic and epidemiological characteristics of each category of epidemic by aggregating data from a large subset of countries in those categories. Definitions and the countries used to construct and model scenarios are provided in the appendix. Figure 7 shows historical trends in prevalence for these agglomerations.

The unit costs of interventions were based on regional averages from published and unpublished literature<sup>91</sup> (appendix). Much of this information is available in an interactive unit cost database,<sup>92</sup> and some information has been updated by country teams during validation workshops held by UNAIDS for the Fast-Track analysis.<sup>9</sup> The costs for countries in the hyper-endemic and generalised epidemic categories are derived from average costs within sub-Saharan Africa. The costs for IDU-driven epidemics are based on eastern Europe, and the costs for concentrated epidemics come from data from Latin America, east Asia and the Pacific, and south and south-east Asia. Large variations in unit costs between countries in the same epidemic category can occur. For example, the





**Figure 7: National HIV prevalence (%) among adults age 15-49 years, by epidemic category, 1980-2015**  
IDU=injecting drug use.

costs of ART differ widely between middle-income countries. The costs shown in the appendix are medians for all the countries used in a given epidemic category. These unit costs comprise the costs of commodities, supplies, and service delivery. Costs of programme administration are added to the total intervention costs as a fixed percentage. The costs included are primarily for intervention implementation in the health sector. However, about 10% of costs are for health-system strengthening activities and some other costs (school-based education, opioid substitution therapy) are shared with other sectors. The costs of research and development are not included.

The following four scenarios were designed to illustrate key drivers of future trends and are intended to portray a range of possible future conditions, depending on the strength of the AIDS response.

In the scenario of Current Efforts, the current coverage of all interventions remains constant. The number of people receiving services, and thus the total costs, increase somewhat due to population growth, especially in the hyper-endemic and generalised epidemic settings.

In the Global Goals scenario, maximum coverage targets are achieved by 2020 and 2030. These are goals of UNAIDS, as described in the Fast-Track report,<sup>9</sup> that aim for a treatment coverage of 90% of all people living with

HIV (ie, beyond current WHO guidelines). This scenario will need major improvements in testing to achieve early diagnosis and linkage to care.

In the Best Case scenario, coverage increases to a level that matches the coverage achieved by the best performing country in the given epidemic category by 2020, as defined by the highest coverage of any country in the region.<sup>93</sup> This scenario suggests that all countries in a certain category step up politically and financially and achieve the performance of the most positive outlier in their group. Note that the term best case is not always a good or ideal case, but is simply the highest coverage achieved of any country in that category. Some countries might do well on a particular intervention, but perform badly on another one, or violate human rights.

In the Financial Constraint scenario, coverage increases are constrained to be no more than the expected annual increase in gross national income (GNI) per person. These rates are 1.6% for hyper-endemic countries, 2.6% for generalised epidemics, 2.0% for IDU-driven epidemics, and 2.9% for concentrated epidemics.<sup>94</sup> This scenario assumes that national government and donor support for HIV efforts will grow in line with overall economic trends because HIV's priority ranking among competing uses for funds remains where it is today. HIV does not lose its relative importance on national and international agendas, but also does not attract additional support or rise up in the priority rankings.

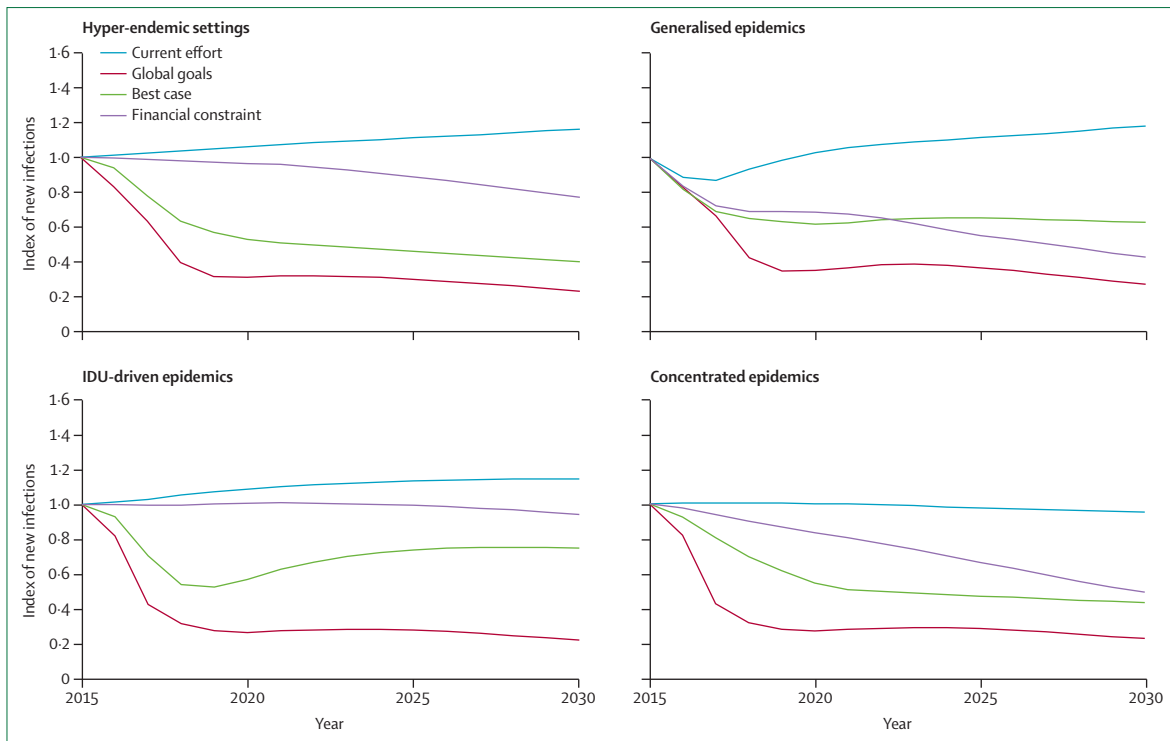
We did not explore a scenario of decreasing financial resources for HIV because, despite the harsh austerity imposed during the financial crisis and dire predictions that HIV spending would suffer, total resources for HIV have in fact been stable for the past few years, and there are no indications of a decrease in the near future.

The appendix provides current coverage and the coverage targets by scenario. Detailed descriptions of the interventions are available elsewhere.<sup>95</sup>

### Effect of each scenario on the AIDS epidemic

On the basis of this analysis, we found that if the AIDS response were to remain similar to current efforts, AIDS deaths and new infections can be expected to rise under almost all epidemic settings. In hyper-endemic countries, deaths could increase by over 50% by 2030 from 2015 levels. Furthermore, even in the most optimistic Global Goals scenario, hundreds of thousands of new HIV infections and HIV related deaths will still occur annually by 2030.

Figure 8 shows the effect of these scenarios on new infections in each epidemic category, using an index standardised to 1.0 in 2015. In the Current Effort scenario, incidence of HIV infection would remain roughly constant in the future. With population growth, the number of new infections would gradually rise in some settings. The largest effect is seen in the Global Goals scenario, where new infections in generalised epidemic and hyper-endemic country settings drop to



**Figure 8:** Change in new infections, by epidemic category and scenario  
IDU=injecting drug use.

just one quarter of their 2015 level by 2020 and to just 10% of their 2015 level by 2030. In this case, the rapid scale-up of all interventions by 2020 reduces incidence in these settings to such a low level that the epidemic continues to decrease even after coverage targets are reached. Note, however, that the decrease in prevalence is slow because the population of people living with HIV at present remains alive on ART. With ART, people living with HIV transmit fewer new infections each year, but transmission continues until this population reaches old age and dies of AIDS or other causes. In IDU-driven epidemics, the Global Goals scenario reduces new infections by almost 80% by 2030.

Both the Best Case and Financial Constraint scenarios are intermediate effects in generalised epidemic and hyper-endemic settings compared with Global Goals but show the same decreasing trend in the long term. However, the pattern is different for IDU-driven epidemics, where the Best Case scenario does not include much scale-up of drug-substitution programmes because coverage of opioid substitute therapy is low in all of the countries modelled in the IDU-driven category at present (appendix). The best case of any of these countries is only 1% coverage in Vietnam (appendix), and there is therefore not much scale-up of opioid substitute therapy in the Best Case scenario compared with Global Goals, where coverage is 40%. As a result, new infections in IDU-driven epidemics under the Best Case scenario drop by almost 50% by 2020

because of the scale-up of ART, but then the epidemic rebounds due to continued strong transmission among injecting drug users, so that new infections only drop by 30% of their 2015 level by 2030. Similarly, slow growth in coverage of opioid substitute therapy in the Financial Constraint scenario means that it will take a long time to materialise substantial reductions in new HIV infections and AIDS-related deaths, with less than a 10% reduction in new infections by 2030. In the concentrated epidemics that are not IDU-driven, but where the main modes of transmission are sexual, higher projected rates of per person economic growth and higher current coverage in some countries have a large effect in the Best Case and Financial Constraints scenarios, with around a 50–60% reduction in new infections by 2030. These two scenarios show that under optimistic, if not ideal assumptions of countries stretching themselves to achieve the coverage levels of their best-performing peers, and of countries expanding their HIV programmes in line with expected economic growth, they can continue to bring down the number of new infections to substantially lower levels than at present in some epidemic settings but not all. This is good news, but national governments will need to maintain their support for HIV efforts commensurate with rates of budget growth and invest in the delivery platforms to scale up combination prevention and treatment to much higher levels than at present. These assumptions might not be realistic in many countries.

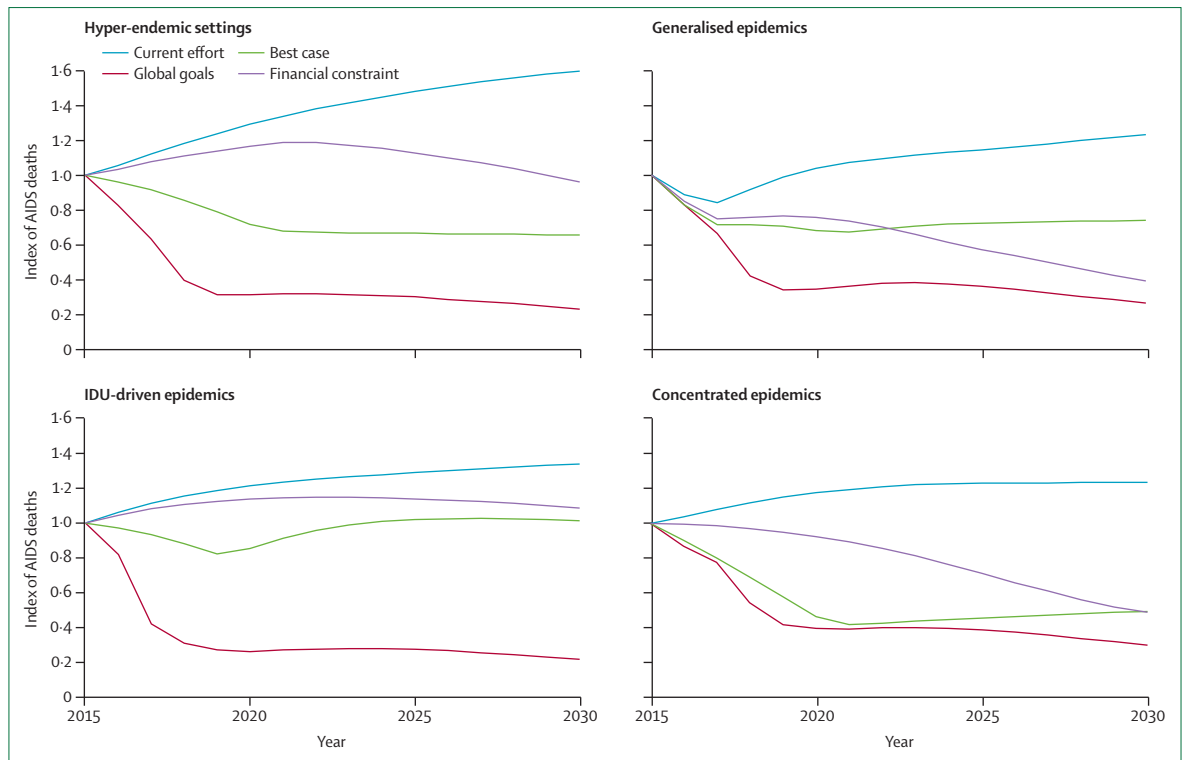


Figure 9: Change in AIDS deaths, by epidemic setting and scenario  
 IDU=injecting drug use.

Figure 9 shows a similar pattern for deaths from AIDS, although the difference between the scenarios is smaller because ART coverage is already high in some countries.

**Effect of intervention**

The contribution of the different prevention interventions will vary depending on the epidemic setting. In hyper-endemic countries, the major effect will probably come from scaling up voluntary medical male

circumcision, condom promotion programmes, ART, behaviour-change programmes, and pre-exposure prophylaxis. In the generalised epidemics, the scale-up of ART is expected to contribute the most to the reduction in new infections, followed by condoms, behaviour-change communications, outreach to sex workers, and pre-exposure prophylaxis. The major effect in IDU-driven epidemics is estimated to come from opioid drug substitution, needle and syringe exchange, and outreach to injecting drug users, followed by ART. In the concentrated epidemics, the major contributors are expected to be ART and outreach to MSM.

Note that the analysis includes only those interventions that have direct effect on HIV transmission, either by reducing the probability of transmission or by supporting behaviour change to reduce risk. Other actions, such as structural changes to reduce the risk environment, would also have a major effect, but these interventions are not included here because of the difficulty of modelling such interactions at present. The effects of combinations of interventions in a full multi-sectoral response are also not included, but could be substantial, thereby enhancing both effect and cost-effectiveness. Finally, although the results do take into account the ageing of the population given increased treatment and prevention coverage, extra costs associated with the

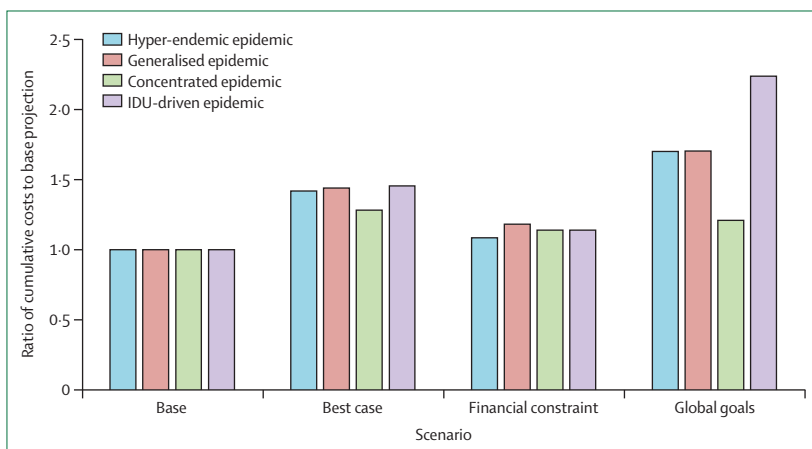


Figure 10: Relative costs by scenario and epidemic category, 2014–30  
 IDU=injecting drug use.

ageing population, including managing their HIV-related comorbidities and unrelated chronic diseases, have not been included. Transmission probabilities used in the modelling are shown in the appendix.

### Expected costs of the four scenarios

Figure 10 shows that, relative to the Current Effort scenario, the costs of the three other scenarios are very high, with a necessary increase in funding of 30–125%. For concentrated epidemics, the Best Case scenario is the most expensive (about 30% higher than in a Current Effort scenario) because it assumes high coverage of ART (all countries would reach Brazil's coverage) and a higher coverage of some general population interventions than required under the Global Goals scenario, such as community mobilisation and school-based education.

Table 1 lists the epidemics and income levels of the 108 low-income and middle-income countries used in the modelling, and table 2 provides the estimated resources needed in each of the four scenarios, both stratified by epidemic category. Almost all of the global disease burden is located in hyper-endemic and generalised epidemic countries. In absolute terms, the expected financial burden of HIV in the low-income and middle-income countries is most pronounced in the small set of hyper-endemic countries where the resources needed simply to maintain the Current Effort are about US\$5.8 billion per year until 2030. If these

expenses were fully funded by the countries themselves, it would represent a staggering 30% of current government health expenditure and 1.2% of present GDP. In the broader set of countries with generalised epidemics, even the cost of the Current Effort scenario would cost \$6.3 billion a year, almost 40% of all government health spending and about 0.7% of GDP.

Scaling up to the more ambitious Global Goals scenario in hyper-endemic settings would necessitate that these countries spend an average of \$9.8 billion over the next 15 years, equal to more than half of current government health budgets and 2.1% of GDP. To meet Global Goals in hyper-endemic countries would cost about 70% more than in a Current Effort scenario during the next 15 years. In generalised epidemic settings, such a scale-up would require an average of \$10.7 billion a year, also around 70% more than in the Current Effort scenario, equal to a staggering two-thirds of current health spending and about 1.1% of GDP. To meet the costs of the Best Case and Financial Constraint scenarios in hyper-endemic and generalised settings would be less onerous than in the Global Goals scenario but still greater than in the Current Effort scenario. The costs of meeting the Financial Constraint scenario are 10–25% greater than in the Current Effort scenario (\$6.3–7.5 billion in total), and to meet the Best Case scenario would cost 40–50% more (\$8.2–9.1 billion).

Clearly, in many of these settings, such levels of financing, especially for Global Goals, would be fiscally and politically impossible and unsustainable for the

	Number of countries	HIV population 2013 (% of total)	New infections 2013 (% of total)	GDP 2012, US\$ (% of total)	GHE 2012, US\$ (% of total)
Hyper-endemic country	9	12.5 million (40%)	670 000 (35%)	\$472 billion (2%)	\$19 billion (3%)
Generalised epidemic	30	12 million (38%)	770 000 (40%)	\$982 billion (4%)	\$16 billion (2%)
Concentrated epidemic	42	5.1 million (16%)	360 000 (18%)	\$9372 billion (42%)	\$277 billion (37%)
IDU-driven epidemic	27	1.7 million (6%)	140 000 (7%)	\$11 678 billion (52%)	\$435 billion (58%)
Total financial burden	108	31.3 million	1940 000	\$22 504 billion	\$747 billion

GDP=gross domestic product. GHE=government health expenditure. IDU=injecting drug use.

**Table 1: Financial burden of AIDS response in low-income and middle-income countries, grouped by epidemic category**

	Current Effort scenario			Best Case scenario			Financial Constraint scenario			Global Goals scenario		
	Average annual RNE (US\$)	RNE as a share of GHE (%)	RNE as a share of GDP (%)	Average annual RNE (US\$)	RNE as a share of GHE (%)	RNE as a share of GDP (%)	Average annual RNE (US\$)	RNE as a share of GHE (%)	RNE as a share of GDP (%)	Average annual RNE (US\$)	RNE as a share of GHE (%)	RNE as a share of GDP (%)
Hyper-endemic country	\$5.8 billion	30.4%	1.22%	\$8.2 billion	43.1%	1.73%	\$6.3 billion	32.9%	1.33%	\$9.8 billion	51.6%	2.08%
Generalised epidemic	\$6.3 billion	39.4%	0.64%	\$9.1 billion	56.7%	0.92%	\$7.5 billion	46.6%	0.76%	\$10.7 billion	67.1%	1.09%
Concentrated epidemic	\$7.0 billion	2.5%	0.07%	\$8.9 billion	3.2%	0.10%	\$8.0 billion	2.89%	0.08%	\$8.5 billion	3.1%	0.09%
IDU-driven epidemic	\$1.4 billion	0.33%	0.01%	\$2.1 billion	0.48%	0.02%	\$1.6 billion	0.37%	0.01%	\$3.2 billion	0.73%	0.03%
Total resources needed	\$20.5 billion	..	..	\$28.3 billion	..	..	\$23.3 billion	..	..	\$32.2 billion	..	..

GDP=gross domestic product. GHE=government health expenditure. RNE=resource needs estimates for HIV, 2014–30. IDU=injecting drug use.

**Table 2: Resource needs of low-income and middle-income countries in four scenarios, grouped by epidemic category, 2014–30**

countries to afford using only domestic resources, even when supplemented by international funding. Substantial additional funds and major cost efficiencies will be needed for the AIDS response, both from national and international sources.

**Expected burden of costs on countries**

29 countries—just over a quarter of all 108 low-income and middle-income countries—have projected HIV spending needs that exceed 1% of their current GDP, frequently the benchmark for what a country can sustain from domestic funds for the AIDS response. All 29 countries have generalised epidemics or are HIV hyper-endemic. Most are in sub-Saharan Africa, 19 are low-income, seven are lower middle-income, and three are upper middle-income countries. Ten countries (including, in decreasing order of resource needs as a share of GDP, Malawi, Mozambique, Lesotho, Zimbabwe, Swaziland, Haiti, Uganda, and Tanzania) have resource needs that exceed 4% of GDP (figure 11).

In the larger set of countries with concentrated and IDU-driven epidemics, funding requirements during the next 15 years are much less onerous, in part because many of them are middle-income countries with stronger economies than countries with generalised epidemics or that are hyper-endemic, and in part because the number of people living with HIV is a much smaller share of the population. Even in the most ambitious Global Goals scenario, total financial needs (an average of \$11·7 billion annually) amount to just over 3% of government health spending and less than 0·1% of GDP. If the political will to spend so much public money on injecting drug users, MSM, and sex workers exists, the bulk of these countries

should have the fiscal capacity to pay for their national HIV programmes.

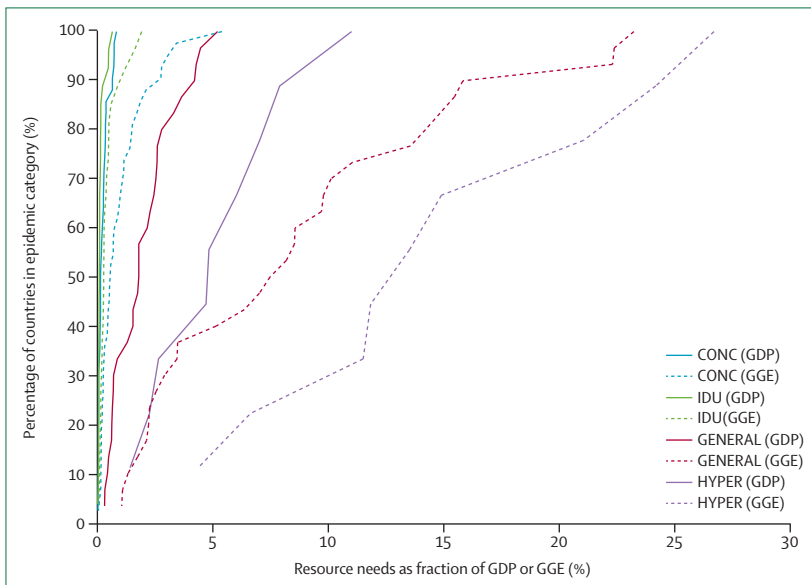
**Can economic growth help countries pay for these increased costs?**

To what extent could the more fiscally-burdened countries draw on the fruits of expected economic growth to pay for their HIV programmes? The International Monetary Fund predicts economic growth per person to average more than 3% across the 108 low-income and middle-income countries between 2014 and 2019, with little variation by epidemic category. Almost all countries are expected to have some growth—in 101 of the 108 countries, expected economic growth is more than 1% per year, after adjusting for population changes. Extension of growth trends towards 2030 to align with projections of resource needs in the Global Goals scenario, and looking at only the portion of economic growth captured by the government, the prospects for national self-sufficiency can be analysed. The results vary across countries, depending on the strength of their economies and the expected burden of HIV.

Typically, government revenues constitute 20–35% of GDP. New government revenues from economic growth could be spent across many government priorities. If countries' revenue and corresponding expenditure levels remain a constant share of GDP, the total resource requirements of the Global Goals scenario until 2030 could be met with 10% of the total growth in government expenditure during that period in 70 of 108 countries. Whether this will materialise depends primarily on the degree of political priority given to HIV control compared with other health and non-health issues.

However, for 24 countries—including seven of the ten countries with the largest number of persons living with HIV—even if 25% of the increase in projected government expenditures was allocated to HIV, however unlikely, this additional funding would not cover the estimated resource needs in the Global Goals scenario. Indeed, for these 24 countries and 14 others, the resource requirements for an AIDS response to meet Global Goals are estimated to exceed the total projected growth in government health expenditures if health budgets grow at the same rate as population-adjusted GDP.

To finance their AIDS responses, these 38 countries, and possibly more, will therefore need to rely on mechanisms other than economic growth alone. Some countries might be able to generate more tax revenues, although this is difficult to do in the short term, or reallocate resources from other priorities. Yet the political reality is that other areas within the health sector and from other sectors, such as education, energy, and infrastructure, will compete intensely for resources. Many countries will continue to need outside donor support, which faces many constraints and for which future prospects are uncertain. For these most fiscally



**Figure 11: Resource needs of countries, grouped by epidemic category**  
 GDP=gross domestic product. GGE=general government expenditure. CONC=concentrated epidemic.  
 IDU=injecting drug-use-driven epidemic. GENERAL=general epidemic. HYPER=hyper-endemic countries.



strained countries, maintenance of external funding as part of international solidarity remains essential.

**Choosing to win or lose**

If used in synergistical combinations, the basic tools are on hand to drive HIV infection rates down to non-epidemic levels. But sustainment of policy commitment and securing of the funds required to control the epidemic is a major concern. A diminished AIDS response would almost certainly undo achievements to date. Experience from both HIV and other disease control programmes shows what happens when political will fades and programmes are scaled back, or when politicians and parliaments make bad policy decisions that are not informed by evidence: the number of new infections rises again. History presents examples where a concerted international policy focus led to promising gains against an infectious disease and a corresponding reversal when international attention shifted before the job was done. A review of 91 instances of the resurgence of malaria over the past 80 years showed that most reversal occurred because of poor funds and political support for malaria control efforts.<sup>96</sup> China implemented massive syphilis control programmes in the 1950s, which were largely effective in curbing the spread of sexually transmitted infections. However, during the past 20 years, syphilis has resurged because of broad societal shifts (rural-urban migration, demographical changes, and economic growth) but also weakening of the national syphilis control policy.<sup>97</sup>

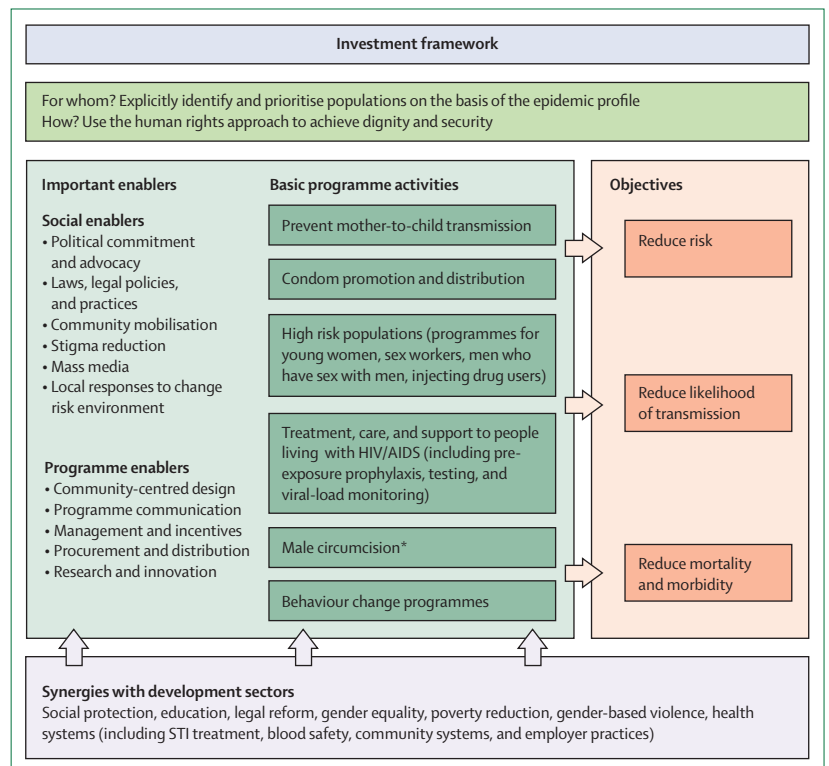
A few countries with stable or decreasing HIV epidemics have been showing trends of increasing risky sexual behaviours among at-risk groups in the past 5 years,<sup>98</sup> with new HIV infections on the rise.<sup>99</sup> There is clear evidence of resurgent HIV epidemics among MSM in Western Europe and North America,<sup>100</sup> with an 86% increase in new HIV diagnoses among MSM between 2000 and 2006.<sup>101</sup> On a broader national basis, trends in new infections have started to reverse and rise again in Uganda after a decade of growing successes, in part because of a decreased focus on prevention among the sexually active population.<sup>102,103</sup> In India, concerns are increasing about how some people in need are unable to access treatment because of low drug stocks<sup>104</sup> and the possible negative effect a recent move to devolve more funding to the states on prevention programmes.<sup>105</sup> A combination of renewed and stronger political commitment and targeted funding could help to regain control of these infection breakthroughs.

The world could be on the cusp of dramatically reducing new HIV infections and AIDS-related death in most, if not all, countries and epidemic situations. However, such a positive future depends heavily on sustained political support and widespread mobilisation of financial, health sector, and community resources. The future of the epidemic hangs in the balance: the decisions made today will have far-reaching consequences in the next decade and beyond.

**Section 4. Better and smarter investments to control the HIV epidemic**

The HIV epidemic has changed in the past 10 years: hospital wards are no longer filled with people dying of AIDS, most people living with HIV are treated on an outpatient basis, and in many countries, the epidemic is now more concentrated. The transition from a fatal disease to a chronic condition and from an emergency to a long-term maintenance response raises a new set of challenges, places different demands on countries, and necessitates new ways of thinking about effective approaches to HIV prevention, testing, treatment, and care.

Much has been written about what needs to be done to achieve epidemic control, including the Strategic Investment Framework for HIV,<sup>95</sup> which describes the need to invest smartly in basic programme activities, important enablers, and synergies with development sectors to see a return and a diminished need for future investments (figure 12). We have two overarching messages. First, to maximise the effect of combinations of interventions and make the best use of available resources, the AIDS response should take a long-term view and be highly localised and focused on the people living with HIV and people who are most vulnerable to HIV. Second, HIV is a societal issue, so a biomedical response aimed at rapidly scaling up testing and treatment is essential but will not be sufficient to control



**Figure 12: Framework for the AIDS response**

\*Applicable in generalised epidemics with a low prevalence of male circumcision. Source: Schwartländer and colleagues.<sup>95</sup>

the epidemic—stigma, discrimination, gender inequality, punitive laws, and other drivers of HIV transmission are also essential targets of the AIDS response.

### From global goals to low-level endemicity

UNAIDS has proposed three new goals for 2020, using 2010 as the baseline: reduce the number of new HIV infections to less than 500 000 per year; reduce the number of HIV-related deaths to less than 500 000 per year; and strive for a world where everyone everywhere lives a life free of HIV-related discrimination.

To attain these aspirational UN goals and targets (appendix), the spread of HIV among young women in southern and eastern Africa must be stopped, and the number of new HIV infections among sex workers, MSM, and people who inject drugs must be substantially reduced. The global HIV epidemic consists of many different local epidemics that change over time and therefore, operationally, programme planning and implementation should be driven by national and sub-national level targets.

### Defining low-level endemicity

One urgent priority is for the international AIDS community to agree on a precise scientific and epidemiological definition of low-level endemicity for HIV. A point in time will come when policy makers no longer accept vague language and general goals. Defining low-level endemicity would allow for the overarching goal and targets for current work to be framed very specifically, enabling every country to set realistic annual targets for achievement, although the pace at which countries can achieve epidemic control will vary depending on their HIV disease burden.<sup>106</sup> This information is urgently needed to better focus HIV programmes now. The epidemiological concepts of elimination (ie, reduction to zero of the incidence of infection in a defined geographical area as a result of deliberate measures to prevent transmission)<sup>107</sup> and eradication (ie, permanent reduction to zero of the worldwide incidence of infection)<sup>107</sup> refer to specific endpoints in worldwide efforts to control an infectious disease. These concepts are not readily applicable to the HIV epidemic at this time because millions of people are living with HIV and no cure is available. But epidemic control or low-level endemicity should, at least in theory, be possible to achieve with existing interventions.

Low-level endemicity (the reduction of disease incidence, prevalence, morbidity, and mortality to a locally acceptable level)<sup>107</sup> is reached when the reproductive rate of infection ( $R_0$ ) is less than 1.  $R_0$  is the average number of secondary cases that arise from a single new case of infection and is a measure of the propensity for an epidemic to spread. Reaching an  $R_0$  of less than one requires a progressive decrease in HIV incidence in the defined geographical area, and the so-called locally acceptable level is a point where HIV no

longer represents a public health threat and is no longer ranked among the leading causes of a country's or high-risk community's disease burden.

Various definitions have been proposed for financial, epidemiological, and programmatic tipping points on the basis of various formulas accounting for annual deaths, new infections, and persons initiating ART.<sup>108</sup> However, with each definition, even after the tipping point has been reached, an unacceptably high level of new infections can remain and the period of time before HIV is no longer a public health threat can be long.

It might be useful to pursue a novel approach and model the level of HIV transmission that would be low enough for a 50%, 60%, or 70% effective vaccine to eliminate HIV. Such an approach could have several advantages: it would set a firm target for low-level endemicity to be achieved in every location and population, consistent with recent efforts by UNAIDS.<sup>7</sup> This approach would also help governments to avoid making an arbitrary choice of when a level of new infections is acceptable, which would vary substantially across countries, and instead articulate a shift of the epidemics to a level of fragility and direct the focus towards an ultimate goal of elimination. The use of a vaccine characteristic to set this criterion could be partly notional—it need not necessarily be a vaccine that finally tips the HIV epidemic into elimination, but this definition would also serve to help direct vaccine research towards a convergence of technological innovation for tomorrow and public health interventions to begin today.

### What needs to be measured?

Progress towards epidemic control can be measured by the rate at which new hot spots emerge and by reductions in HIV incidence in each hot spot or high-risk population identified. Reliable estimates of new infections, the total number of HIV infected individuals, and the proportion diagnosed, retained in care, and receiving ART are vital for epidemic control. Monitoring of viral load in all people diagnosed with HIV is also essential.<sup>109</sup> Key indicators for measurement are listed in the appendix.

Many countries do not report data disaggregated by age and sex or data on high-risk populations (appendix). Innovative approaches and new tests measuring incidence are needed to collect accurate, timely data on HIV in at-risk young women, sex workers, MSM, and injecting drug users, among others.

### Invest where transmission occurs: in high-risk populations and hot spots

As with many health issues, a blanket response does not work for HIV prevention. To have the largest effect, interventions need to be tailored to the differing needs of population groups most at risk of HIV infection and to the local context (figure 13).<sup>56</sup> For populations experiencing stigma and discrimination, such as sex workers, MSM and people who inject drugs, service delivery needs

to be tailored to the needs of populations and sensitive to the protection of their human rights. Methods to increase awareness of effective prevention measures for one group are unlikely to work in another group. For example, girls in secondary school and the same-age girls who are not in school require different approaches.

Additionally, because HIV risk factors vary over a lifetime as circumstances change, individuals need different interventions. For example, promotion of condom use and safer sex, pre-exposure prophylaxis, and even sero-sorting (the practice of an individual choosing a sexual partner who has the same HIV status) might be the best approaches during one phase of an individual's life. When the same individual enters a long-term partnership, they can shift to a test-and-treat approach and pre-exposure prophylaxis. The value of this approach can be seen, for example, through results of pre-exposure prophylaxis trials that showed a clear difference in condom usage related to relationship type.<sup>111</sup>

Such targeted action demands active identification, characterisation, and prioritisation of high-risk groups within each country and a high level of understanding of the community. Geo-mapping of the incidence of HIV infection within a given region or city can be used to identify relative degrees of increased risk that can then maximise the identification of those at high risk for HIV infection and their entry and retention in care. Continued surveillance and targeted prevention strategies afford an additional opportunity to find people who are newly infected, which is when they are most infectious.<sup>112</sup> However, the identification of populations at high risk is difficult, particularly in hard-to-reach populations or in high-burden epidemics, and it is also very expensive.

People individually have an important role. Whenever possible, individuals need to take responsibility for prevention, know their HIV status, and minimise the risk of infecting others. Because HIV is intertwined with sex and complicated drivers of behaviour, it will always be difficult to control. This explains why, for example, gay men in high-income countries with very low levels of discrimination, no or few legal obstacles, and free access to services have much higher infection rates than the general population. Biological (transmission through anal sex) and behavioural factors (more sexual partners) drive the high infection rates in this group, along with social marginalisation (official government underfunding of the AIDS response among gay people in many rich countries) in even the most open societies.

Much can be learned from the new approach taken by the Kenyan Government to reduce HIV transmission (panel 1). An overarching enabling environment for HIV prevention, which includes sustainable investment in HIV prevention research, human rights protection, stigma reduction for high-risk populations, and interventions to address gender and cultural norms that increase risk of HIV infection are at the core of this roadmap. Also included are targeted strategies to increase

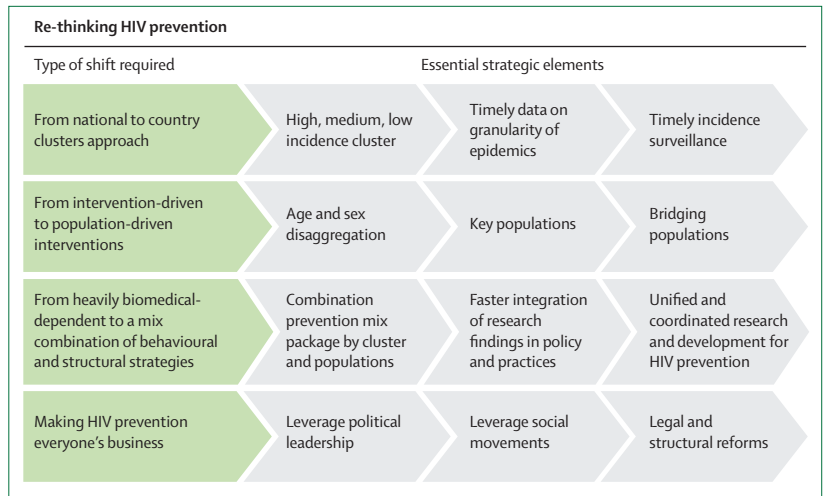


Figure 13: Key aspects of national HIV prevention strategies  
Source: Kenya HIV Prevention Revolution Road Map.<sup>110</sup>

and sustain knowledge of HIV status, improve retention in care, strengthen linkages to reproductive health services, and improve capacity and linkages between community and facility-level interventions.

**Stronger community leadership and engagement**

Communities affected by HIV are key to the targeted action and long-term strategies needed to achieve epidemic control. Interventions and strategies designed elsewhere and parachuted into communities, however well intentioned, are not effective or efficient ways to roll out tailored HIV programmes. Efforts to raise awareness of how to prevent HIV infection, encourage behaviour change, increase testing, improve access to care and ART

**Panel 1: Kenya aims to revolutionise HIV prevention**

The ambitious *Kenya HIV Prevention Revolution Road Map—Countdown to 2030*,<sup>110</sup> launched in June, 2014, seeks to reduce the annual number of new HIV infections from an estimated 101 560 in 2013 to zero in 2030 at a cost of US\$ 19.9 billion. If successful, this refocused and prioritised HIV prevention strategy would avert an estimated 1 149 000 new HIV infections and 761 000 AIDS-related deaths by 2030. The roadmap explicitly recognises that the Kenyan HIV epidemic displays variable epidemiological dynamics and considerable regional differences.

Since HIV prevention interventions are also sensitive to local context, the roadmap hinges on detailed analyses on population group and geographical disparities in incidence levels. On the basis of number of new HIV infections, the country is split into high, medium, and low clusters. Innovative surveillance for HIV incidence across clusters is coupled with mathematical modelling, which is used to prescribe the optimum combination of prevention interventions for adequate coverage in each cluster.

adherence, and optimise clinical outcomes must be strongly rooted in the community context.

Community action can have a large effect on stigma, discrimination and other barriers. Quality data, disaggregated by age, sex, and high-risk population group, that is better packaged and more widely disseminated will equip groups to engage in the AIDS response, improve the way services are provided, monitor the effects of policies and legislation, and increase their ability to hold people and institutions to account. For example, transgendered people living in the Asia-Pacific region are working with academics and the UN on studies of HIV prevalence and broader health needs in their communities, arguing that they have superior access to highly marginalised communities and will be more likely to identify issues than professionals working alone.<sup>113</sup> Similarly meaningful engagement with any community for whom programmes and policies are intended should be a priority at all stages of the process. For example, the Avahan initiatives in south India included and built on community mobilisation activities. This combined intervention approach not only reduced women's vulnerability to HIV, but also reduced their exposure to violence from the police and clients. Analysis suggests that the inclusion of community mobilisation and empowerment interventions had an effect on HIV prevention and was highly cost effective.<sup>114</sup>

**Improve the quality of lifelong ART**

The ability to deliver care for a chronic health condition and to retain people in services in resource-constrained environments is becoming increasingly possible in HIV programmes. As a result, the primary treatment objective has now shifted from initiating ART for eligible people to achieving good long-term clinical outcomes and providing life-long quality services, besides eliminating AIDS-related mortality. In this respect, much more needs to be done to design and scale up innovative approaches that have been shown to improve testing uptake, retention in care, and adherence to treatment.

The best way to prevent AIDS-related deaths, preserve immune function, improve clinical outcomes, reduce the risk of HIV transmission, and minimise the development of drug resistance is to achieve early viral suppression and to maintain it. Viral suppression is the

final step of the so-called treatment cascade, which also involves diagnosis, linkage to care, retention in care, and initiation of ART.

On the basis of available clinical evidence, WHO treatment guidelines<sup>115</sup> for individual patient care recommend ART initiation when the patient's CD4+ cell count drops below 500 cells per mL. However, UNAIDS policies recommend ART initiation in at least 90% of HIV positive patients without due consideration to CD4+ cell counts to gain the public health and prevention benefits of high ART coverage. A single clear and consistent set of criteria for treatment initiation is urgently needed to reduce the confusion that reigns at the coalface of ART implementation services.

Results of a 2014 survey<sup>116</sup> in eight high-income countries revealed just how difficult it is to achieve viral suppression, even in well resourced environments. Table 3 shows how different high-income countries have different weaknesses along the treatment cascade. However, even the best-performing country (Denmark, with viral suppression in 59% of people living with HIV) falls far short of the target for viral suppression set by UNAIDS (ie, achieving the 90–90–90 treatment targets,<sup>7</sup> where 90% of people living with HIV know their HIV status, 90% with HIV diagnosis receive ART, and 90% have viral suppression, by 2020 would mean that 73% of all people living with HIV would have suppressed viral load). Data from the USA are supported by a report from the CDC that less than 30% of Americans living with HIV were virally suppressed.<sup>117</sup> Similar trends are found in low-income and middle-income countries (figure 14).

An understanding of the many challenges people face in the treatment cascade will point to the actions needed to improve outcomes. There is growing evidence<sup>118</sup> that these challenges can be overcome, provided there is strong synergy between patients and care providers. As with prevention interventions, challenges vary from country to country and community to community, but among the most common challenges are poor access to testing and culturally competent HIV care, fear, stigma, side-effects, cost of care, transportation costs, and mental illness. Figure 14 highlights some of the challenges at each stage in the treatment cascade.

Involvement of people living with HIV in the design of both community-based and facility-based services has been shown to improve quality, adherence, and even

	France	Netherlands	USA	UK	Australia	BC, Canada	Denmark	Georgia
Number living with HIV	149 900	25 000	1 148 200	98 400	33 000	11 700	6 500	4 900
Percentage diagnosed (%)	81%	..	82%	..	75%	71%	85%	52%
Percentage linked to care (%)	>74%	73%	66%	79%	..	67%	81%	44%
Percentage on ART (%)	>60%	59%	33%	67%	35%	51%	62%	26%
Percentage with undetectable HIV RNA (%)	52%	53%	25%	58%	32%	35%	59%	20%

ART=antiretroviral therapy.

**Table 3: Performance of national treatment programmes of selected countries, 2013<sup>116</sup>**

efficiency. Successful models include peer-to-peer support, peer approaches to mediate in the interface between client and provider (such as the programme in Zomba Hospital, Malawi, involving people living with HIV to help filling in ART data, counselling, and vital sign measurement), and user-driven care models that are facility-based but client-controlled, such as the Adherence Clubs in Khayelitsha, South Africa.

**Testing**

Knowledge of HIV status is an essential first step to access HIV services. Stigma, denial, and a poor understanding of risk have contributed to lower-than-expected rates of HIV testing.<sup>7,119</sup> Several strategies to overcome these challenges are showing promise in improving HIV testing uptake, increasing both the number of people tested and the frequency of testing.

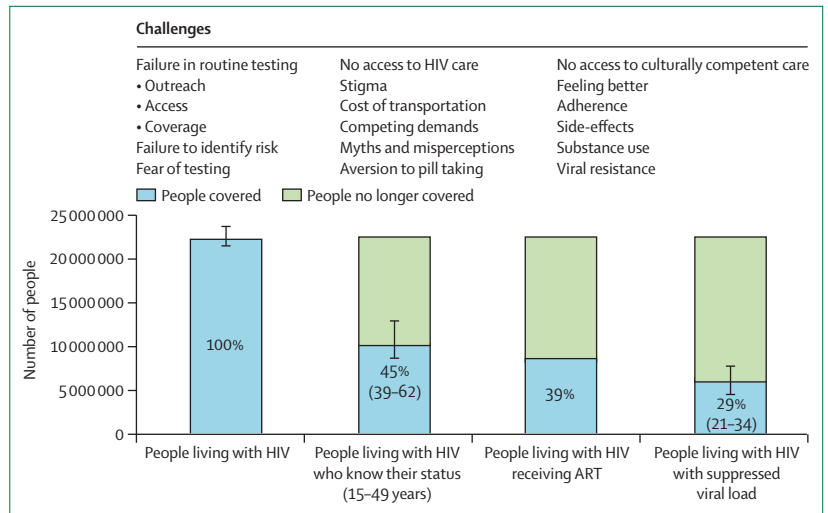
Provider-initiated testing and counselling<sup>120</sup> involves the routine offer of an HIV test in diverse health-care facilities. As of December, 2013, 89 (78%) of 117 low-income and middle-income countries had implemented policies for provider-initiated testing and counselling.<sup>121</sup> For example, implementation of provider-initiated testing in Botswana more than doubled the annual number of people receiving an HIV test.<sup>122</sup>

Home-based testing, counselling campaigns,<sup>123</sup> and point-of-care rapid tests are typically undertaken on a community-wide basis to reduce the stigma associated with an HIV test.<sup>124</sup> One home-based testing campaign in an informal settlement in Nairobi offered HIV testing services to 24450 people, with 81·7% accepting and 65·4% testing for the first time, yielding a prevalence of HIV infection of 7·5%.<sup>125</sup> Incorporation of HIV testing and counselling in community-level multi-disease campaigns has proven effective in reaching large numbers of previously untested individuals. In rural Uganda, a multi-disease community campaign delivered HIV testing to 4795 (76%) of 6343 residents of one community, 10% of whom tested positive.<sup>126</sup>

Self-testing, in which individuals use over-the-counter test kits to learn their HIV status, has emerged as a potential additional way to increase the proportion of people living with HIV who know their HIV status. Countries that have formally allowed the marketing of self-testing kits include France, Kenya, the UK, and the USA.<sup>127</sup>

**Viral suppression and patient-centred treatment delivery**

Regular tests of viral load, now a standard component of care for people with HIV in high-income countries, is rare in low-income and middle-income countries, which still rely on CD4-cell count tests. People taking ART who have an undetectable viral load have a low risk of disease progression and onward HIV transmission. A rise in viral load is either due to poor adherence or drug resistance.<sup>115</sup> Resistance to ART is expected to increase in the next 5 years.



**Figure 14: Challenges at each stage of the HIV treatment cascade for adults in sub-Saharan Africa, age 15 years or more**  
Source: UNAIDS. The Gap Report (2014).<sup>4</sup>

The emergence of drug resistance could compromise the effectiveness of scaling up ART. Although the prevalence of acquired drug resistance and treatment failures is low at present, especially during the first year of treatment, the prevalence of transmitted drug resistance in low-income and middle-income countries has increased consistently, with available data suggesting that in Uganda, prevalence is as high as 11·6%.<sup>128</sup> Drug resistance is an area of increasing concern since the evidence indicates an association between resistance and higher levels of ART coverage.<sup>129</sup>

Viral load is the most reliable indicator of disease progression and drug resistance, so a widespread introduction of viral load testing, ideally as a point-of-care diagnostic, is an urgent priority. Several laboratory-based viral load technologies are already available but tend to be costly, which delays the receipt of results.<sup>130</sup> In 2014, the South African Government obtained a new worldwide price ceiling for the leading viral load technology, representing a 40% price reduction relative to the previous price and saving \$150 million in 5 years.<sup>131</sup> Simpler, less expensive, and more rapid point-of-care technologies are expected to become available in the near future.<sup>130</sup> Just as for first-line ART, a fixed dose combination pill is needed for standardised second-line therapy to improve compliance. Improved discipline in prescriber behaviour is also a pressing priority: standard first-line and second-line regimens need to be consistently used to slow the development of resistance, reduce costs, and address supply procurement problems. Longer-lasting injectable ARTs would further simplify treatment and might make pre-exposure prophylaxis more acceptable and effective.

ART treatment should be patient-centred. This includes fitting drug provision into patient's lives, minimising their waiting times, providing treatment in community pharmacies, and promoting adherence clubs.<sup>118</sup>



### Commodity security

Access to drugs and other health commodities (eg, CD4 and viral load tests, early infant diagnostics, condoms) is a key component of treatment programmes, alongside efficient service delivery. Nevertheless, problems with the low availability and affordability of ARTs (and drugs to treat comorbidities) in low-income and lower middle-income countries remain, and low or empty drug stocks are common in several countries. The reduced number of manufacturers of generics is very concerning, as profit margins are ever decreasing, and might become a major obstacle to the further scaling up of ART.

The intersections between intellectual property rights, innovation, and public health<sup>132</sup> are important if the issues of market failure in drug development, manufacture, and pricing and the unmet needs for research and development are to be solved.<sup>133</sup> While first-line drugs are widely available and affordable in developing countries, second-line and third-line regimens are often scarcely affordable because of their high prices and restrictions on the use of generic pharmaceuticals under Free Trade Agreements in some countries.<sup>134</sup> Moreover, the availability of ART formulations for children is far from sufficient to curb the epidemic in children.

Costs of drugs must be managed<sup>135</sup> to achieve equitable access to them. Several initiatives are in progress to achieve local and regional production of essential health commodities in sub-Saharan Africa.

Tiered pricing and generics have increased access to drugs in low-income countries. However, countries that achieve middle-income status will lose eligibility for inexpensive international financing and access to low ART prices. As a result, the Equitable Access Initiative was launched by the Global Fund and others to adopt a more refined income classification to protect countries from the public health disadvantages of reaching middle-income status and to increase transparency about pricing, price negotiations, and tiered pricing.<sup>136</sup>

### Smart and selective integration

The infrastructure developed for HIV care provides a multi-contextual platform to address other health issues. Integration of services in an appropriate way has the potential to address patients' multiple needs while reducing the service costs, enhance the effectiveness and sustainability of programmes, and generate wider health benefits.<sup>137</sup>

Evidence in support of both the feasibility and desirability of integrated services for HIV care is mounting. In Malawi, for example, results of a retrospective analysis of the integration of antenatal care, HIV testing, and hospital delivery among pregnant women in rural areas<sup>138</sup> showed that HIV testing among the antenatal care attendees increased from 52.6% to 98.8% after the introduction of routine (opt-out) HIV testing. Most experience to date is drawn from the integration of HIV care services with programmes to enhance reproductive, maternal, neonatal,

and child health,<sup>139,140</sup> and care for patients with tuberculosis<sup>141,142</sup> or non-communicable diseases.<sup>143-145</sup>

The three areas where integration of HIV services into general health services makes most sense are in the prevention of HIV transmission from mother to child into antenatal clinics, and delivery of life-long ART into the primary care system, as long as the latter does not reject people living with HIV, and in tuberculosis control efforts.

Findings also suggest that no single approach to integration is adequate to all contexts.<sup>145</sup> Successful integration will depend on several factors, including the nature of the epidemic, administrative arrangements, local decision-making capacity, and community engagement. Research to identify the right combinations of factors to optimise integration is scant. In some cases, efforts to integrate services for high-risk populations are clearly counterproductive.<sup>146</sup> For example, integration of prevention and treatment for sex workers, MSM, or injecting drug users with wider health services could in many contexts create barriers to access and reverse progress. National integration working groups with diverse membership that include government and non-government participation and representatives from each of the services considered for integration are essential to inform those decisions and processes.

## Section 5. Research: an important foundation for a successful AIDS response

Scientific research has underpinned the AIDS response since the very first cases were reported in 1981<sup>3</sup> and must continue to do so. Here we look ahead at the scientific research agenda needed to achieve epidemic control and eventually eliminate HIV. But before discussing future HIV research priorities, we briefly describe the major funders of HIV research and highlight some general trends in HIV research funding.

### HIV research funding

The contributions of research to the AIDS response were made possible by substantial national and international funding derived from multiple sources. No comprehensive, up-to-date data are available on total worldwide expenditure. The US Government is the largest funder of HIV research; almost all federal funding for HIV research goes to the US National Institutes of Health (NIH). The NIH has a HIV budget of about \$3 billion for 2015, about half of which is dedicated to the National Institute of Allergy and Infectious Diseases (NIAID).<sup>147</sup> NIH funding for HIV research increased substantially between 1986 and 2005, and then it plateaued. Since 2009, NIH international HIV research funding has decreased from \$451.2 million in fiscal year 2015, compared with \$485.6 million in fiscal year 2010.<sup>148</sup>

The US Agency for International Development and the CDC are the next largest contributors to HIV research. The French National Agency for Research on AIDS and Viral Hepatitis is Europe's largest HIV research

programme and the world's fourth largest government contributor to HIV research with a €45 million annual budget.<sup>149</sup> The UK spent £461 million on HIV and virology research between 1997 and 2010, with the Medical Research Council being the lead institution with an investment of £360 million (36%).<sup>150</sup> In 2003, the European and Developing Countries Clinical Trials Partnership was created and has since spent more than €400 million to accelerate the development of new or improved drugs, vaccines, microbicides, and diagnostics against HIV, tuberculosis, and malaria through clinical trials in sub-Saharan Africa. European and other public sector HIV research funding in other geographic regions fell in 2013.

Among philanthropic organisations, the Bill & Melinda Gates Foundation is the leading funder of international HIV research. To date, the Foundation has contributed more than \$2.5 billion to HIV programmes and research besides its additional contribution of \$1.4 billion to the Global Fund.<sup>151</sup> The Wellcome Trust, the Elizabeth Glaser Paediatric AIDS Foundation, the MAC-AIDS Foundation, and several others make smaller but important contributions to global HIV research. Within the private sector, several pharmaceutical companies, such as GlaxoSmithKline, Johnson and Johnson, Gilead Sciences, Merck, and Sanofi-Aventis, are involved in research and development of new ARTs, diagnostics, and HIV vaccines.

Attempts have been made to develop a global research agenda specifically for HIV vaccines, initially by the International AIDS Vaccine Initiative and subsequently by the Global AIDS Vaccine Enterprise. One option is to establish a global forum for policy makers engaged in the AIDS response to interact in a structured way with HIV researchers and research funders at country and global levels. In some countries, national AIDS councils facilitate some of this dialogue. A broader forum has the potential to help researchers and research funders to better appreciate what policy makers are seeking and, just as importantly, for policy makers to appreciate the long timelines and regulatory constraints hampering rapid development, implementation, and completion of new studies.

### Trends in HIV prevention research

The annual AVAC report on HIV prevention research expenditure provides useful data on spending and trends. In view of how important HIV prevention is to the success of the AIDS response and the pressing need to improve behaviour change programmes, increase condom use, and scale up other prevention interventions, it is cause for concern that funding for HIV prevention research only increased marginally from 2009 to 2013 and that funding fell by 4% from \$1.31 billion in 2012 to \$1.26 billion in 2013<sup>152</sup> (appendix).

Of particular concern is the fact that disproportionately affected populations are largely omitted from HIV prevention research trials. Only 6% of trial participants in 2013 belonged to a high risk population.<sup>152</sup>

Additionally, there has been an increasing realisation that people-centred health-care systems, with patients and health-care professionals at the centre of the reforms, need to be developed and assessed.

### HIV research priorities

In a changing HIV research landscape, heightened competition from other health priorities, and stagnant or decreasing resources for HIV research, priority setting is crucial. We have identified eight research priority areas. The specific questions and topics for the first three priorities, implementation research, social and political science research, and epidemiological research, will vary greatly between countries. As a result, each country will need to undertake locally defined research as an essential component of the response to gain an advance. The other four priority areas are product-related global public goods. Investment is needed in all eight priority areas.

#### *Implementation research*

The ability to translate efficacious HIV interventions into a tangible effect is dependent on efficient and effective health systems and HIV programmes. Implementation research has been chronically under-funded but is beginning to gain prominence and resources at the instigation of the US PEPFAR. In poor-resource settings, the challenges of scaling up ART provision are particularly daunting. Particularly, implementation research is needed to improve linkage to care for individuals who are newly diagnosed with HIV and to sustain people in care before and after ART initiation. Innovative ways to retain people in continuous care until viral suppression must be found to reduce transmission and minimise the development of drug resistance.

Implementation research is also needed to find ways to increase HIV testing and circumcision uptake, to address the many challenges in the roll out of pre-exposure prophylaxis programmes, including sub-optimum adherence, health-systems capacity to provide these services, potential drug resistance, and the extent to which these interventions lead to people increasing their high-risk behaviours, and structural interventions. The necessary implementation research goes well beyond improvement of HIV treatment and prevention, to include the growing challenge of integration of HIV services with those for tuberculosis, other sexually transmitted infection and chronic diseases.

#### *Social and political science: research of sexuality, education, behaviour change, human rights, structural drivers*

Social sciences studies, including disciplines such as economics, sociology, anthropology, and politics, are needed to understand how communities, high-risk groups, patients, health-care professionals, policy makers, and politicians behave and construct their practices and understanding of HIV. Areas of research include rights-based approaches to treatment and

prevention strategies and social norms and structural drivers of the HIV response. Cost and cost-effectiveness studies are also needed to identify the most appropriate interventions in resource-limited settings.

Social sciences research is needed to provide a better understanding of the prevention and treatment needs of high-risk population groups. The authors of the three *Lancet* Series papers about HIV and sex workers,<sup>40</sup> MSM,<sup>153</sup> and drug users<sup>154</sup> identified research priorities to better understand what works, what will be adopted by target populations, and how to scale up interventions. For these three at-risk groups, data are limited of HIV incidence and transmission pathways, of best approaches to promote HIV testing, of how best to introduce pre-exposure prophylaxis, of how stigma promotes HIV risks, and of what interventions are effective in reducing these effects.

Studies need to include stand-alone projects and projects integrated with implementation and epidemiological studies, combining a wide range of qualitative and quantitative methods. Qualitative methods should be routinely integrated into assessment designs and assessments should address not only whether an intervention worked, but also the processes of change and the pathways that led to an effect.<sup>155,156</sup>

There is an urgent need for long-term projects to understand the structural and public policy interventions that reduce risk of HIV. Methods have been developed and validated in multiple settings to measure stigma and discrimination;<sup>157</sup> gender inequality, masculinity and gender violence;<sup>158</sup> poverty and livelihoods;<sup>159</sup> and alcohol availability and use.<sup>160</sup> There is less clarity, however, about the best approaches to assess the population-wide effect of interventions that are focused on multiple drivers. There are active debates about how to assess complex social interventions, such as those that target social and sexual relations,<sup>161–165</sup> and in what circumstances randomised controlled trials might be feasible and appropriate.<sup>166</sup> Research is needed to build a better understanding of how changes at a structural level link with biological outcomes.

More research is needed to document the HIV and non-HIV-related effects of HIV programmes, especially in the context of the new Sustainable Development Goals.

### *Epidemiological research to identify high transmission targets for intervention*

As the epidemiology of HIV evolves over time, transmission is becoming increasingly concentrated in certain hot spots and high-risk groups. Research is required to identify the contribution of high-risk populations, such as people who inject drugs, MSM, or sex workers, and hot spots. In these settings, overall country level estimates of stable or decreasing epidemics might be misleading because they could camouflage subgroups within the population or hot spots where the epidemic is continuing to grow unabated. Building on

the epidemiological surveillance, strategic information, and national reporting supported by UNAIDS,<sup>167</sup> HIV trends in these high-risk populations need to be monitored and the effect of appropriate combinations of prevention interventions needs ongoing assessment. Furthermore, specific interventions designed for high-risk populations need to be assessed.

Epidemiological studies of other sexually transmitted infections, such as herpes simplex virus type 2 and human papilloma virus, that have been shown to play a part in HIV acquisition are needed. The role of sexually transmitted infections in facilitating HIV infection needs to be better understood. Strategies to reduce the effect of sexually transmitted infections on HIV risk need to be developed.

### *New therapies, including long-acting antiretroviral formulations*

Within a few years, about 35 million people across the world will need ART. The lifelong daily consumption of a drug in tablet form that constitutes modern ART might not be sustainable at scale. To make HIV treatment sustainable and reduce the risk of sub-optimum adherence, which fosters drug resistance, alternative long-acting formulations are needed. At least two ARTs, administered either as bimonthly or quarterly injections, are now in human treatment and prevention trials for safety and efficacy assessment. Long-acting formulations will be key to the scale-up, feasibility, and cost-effectiveness of treatment and pre-exposure prophylaxis. There is also a continuing need to identify new drug targets, monoclonal antibody therapies, improved formulations for existing drug targets, and new drug designs to overcome resistance.

### *New HIV prevention technologies for women*

Young women in major parts of sub-Saharan Africa bear a disproportionate burden of HIV infection in Africa. In the past 25 years, diaphragms, which are usually used with spermicide for contraception, as well as several microbicides applied to the vagina or rectum, have been assessed in large clinical trials. Unfortunately, the only product to have shown evidence of protection against HIV infection, tenofovir gel, has yielded varying results in subsequent large-scale trials because of low adherence to both daily and coital dosing by the study participants. Monthly vaginal rings containing dapivirine are now in phase 3 trials, whereas new formulations that combine ARTs with contraception are being developed as a strategy to improve adherence through multi-purpose motivation for use.

### *New diagnostic technologies to identify HIV acquisition*

Although antibody-based HIV diagnostic tests are accurate and affordable, they diagnose established HIV infection, and there is no test to identify an individual who is in the process of acquiring HIV infection and seroconverting. As a result, HIV positive individuals do

not know that they have acquired HIV during the period when they are at high risk of transmitting the virus. A monitoring test to identify individuals during acute HIV infection is needed, particularly in high-risk settings.

#### *HIV vaccines*

The development of an HIV vaccine has proved challenging and will probably not be available within the next several years. One of the key challenges is the absence of naturally induced protective immunity in people living with HIV as a path to follow for vaccine development. There is, however, hope that an HIV vaccine capable of preventing HIV acquisition is possible, following the results of the RV144 trial in Thailand<sup>168</sup> in 2009, where anti-V1V2 antibodies<sup>169</sup> might have been responsible for the reported protection. In the past few years, several broadly neutralising antibodies targeting multiple sites of the virus have been identified; some have shown promise in animal challenge studies, and some are being tested for their potential to prevent HIV. Although several T-cell vaccines have disappointed,<sup>170</sup> new animal data showing effective clearance of virus-infected cells using a cytomegalovirus vector<sup>171</sup> have rekindled interest in this approach. Research on HIV vaccines pursuing a range of approaches is essential.

#### *HIV cure*

Research to find a cure for HIV is essential, even though the obstacles to a cure seem insurmountable. Since HIV is seeded as dormant integrated viral genomes in resting T cells (and other reservoirs) very early during acute infection, treatment with combination ARVs, has little, if any, effect on these long-term viral reservoirs. One of the key strategies being pursued, known as shock and kill, is an attempt to use drugs to stimulate the replication of HIV in these resting T cells with simultaneous administration of ARVs to kill off the HIV emanating from the reservoirs. Another pursued strategy is the initiation of combination ART very early in acute HIV infection in an attempt to prevent the establishment of reservoirs or to reduce the size of these reservoirs. The third strategy is an attempt to make CD4 cells resistant to HIV infection, either through genetic manipulation<sup>172</sup> or by removing existing CD4 cells and replacing them with transplanted delta-32-deleted CCR5 CD4-positive cells, the success of which was shown in a patient in Berlin.<sup>173</sup> Data from animal studies suggest that anti-HIV monoclonal antibodies, such as PGT121, might contribute to reduction of the viral reservoirs;<sup>174</sup> this approach is now being pursued in humans. At present, no cure for HIV is in sight, but it is a very important avenue of investigation.

This section has highlighted the little consistency on reporting research funding dedicated to HIV. UNAIDS should consider creating an HIV research desk where all public and private research funders voluntarily report their HIV research funding annually so that UNAIDS

can publish a report on the state of funding for HIV research. Such a report will help identify priorities and gaps and could be a valuable resource to HIV research funders.

## Section 6. Beyond the grand convergence: AIDS and health

The scale of the AIDS challenge, coupled with waning political interest in single-disease programmes, demands that the AIDS response does things differently.<sup>175</sup> The fundamental shift that needs to happen in the next phase of the response is to better tailor the response to people's needs and contexts, optimally use innovation, and address the structural drivers of this epidemic. In its fourth decade, the AIDS response must continue to transform both itself and the environment around it.

Much like the AIDS response in much of its history, today's global health and development agenda is complex and crowded. Alongside the struggle to control infectious diseases, ageing of the population and the escalating global challenge of chronic diseases place unprecedented strain on existing services, requiring novel forms of delivery, partnerships, legal action, and fresh approaches to the environmental, commercial,<sup>176</sup> and social determinants of ill health.

Enhancement of coherence and collaboration—and thereby effectiveness and efficiency—between efforts to

### Panel 2: Beyond the grand convergence

In the *Lancet* Commission on Investing in Health's report, Jamison and colleagues<sup>1</sup> introduced the idea of a grand convergence in health: reducing the burden of infectious diseases and of reproductive, maternal, newborn, and child health disorders in most high-mortality low-income and middle-income countries to rates of the best-performing middle-income countries. The authors propose to do this largely through an ambitious global health investment strategy of scaling up existing and new health interventions and strengthening the systems to deliver them.<sup>1</sup>

This approach to convergence can be strengthened by consideration of the political, economic, social, and cultural determinants of health, which are as important as technical and financial solutions to ending AIDS as a public health threat and accelerating progress on other health challenges. In the *Lancet*–University of Oslo Commission on Global Governance for Health,<sup>2</sup> Ottersen and colleagues focused on the political determinants of health and argued that the continuing major health inequities within and between countries require political solutions that transcend the health sector and national borders and address global governance dysfunctions.

The *Lancet*–University of Oslo Commission on Global Governance for Health<sup>2</sup> calls for stronger cross-sectoral global action for health, including:

- a Multi-stakeholder Platform on Governance for Health supported by an Independent Scientific Monitoring Panel
- strengthened use of human rights instruments for health
- governance rooted in new frameworks for international financing that go beyond traditional development assistance, such as for research and social protection

By embracing and coupling the recommendations of both Commissions,<sup>1,2</sup> we can more effectively and swiftly move the shared AIDS and global health agendas forward.

control HIV and efforts to achieve other health outcomes can drive progress beyond the so-called grand convergence described by the *Lancet* Commission on Investing in Health,<sup>1</sup> with an investment strategy that scales up HIV and other health interventions in a more cost-effective manner (panel 2).

**Conceptual underpinnings of an AIDS and global health approach**

Figure 15 provides a framework to reflect on and operationalise a more integrated AIDS and global health response that will drive progress towards ending AIDS as a public health threat and leverage good practice in the AIDS response to advance other Sustainable Development Goals.

Building on the elements this Commission identifies as good practice, the framework sets out an idealised AIDS response that illustrates mutually reinforcing functions at national and worldwide levels. These functions are guided by people-centred, rights-based, justice-oriented, and equality-driven values.<sup>177</sup> The unprecedented

efforts of AIDS activists and human rights leaders to end discrimination against minorities and vulnerable groups will continue to set the standard for improved access to other health services.

Strong AIDS responses are guided by country-owned, multi-sector, and multi-stakeholder (civil, public, private) coordination mechanisms. These responses adopt strategic investment approaches to a set of basic activities and invest in important enablers and synergies with other development sectors that support access to HIV prevention, treatment, care, and support (figure 12). Country experience and realities inform the global AIDS response, whereas a global system is in place to support country programmes with several important functions. These include global leadership, stewardship, and coordination; the production of global public goods, including research and development and market shaping for essential commodities; strategic information and knowledge sharing; and global solidarity, both in terms of financing and technical cooperation (panel 3).

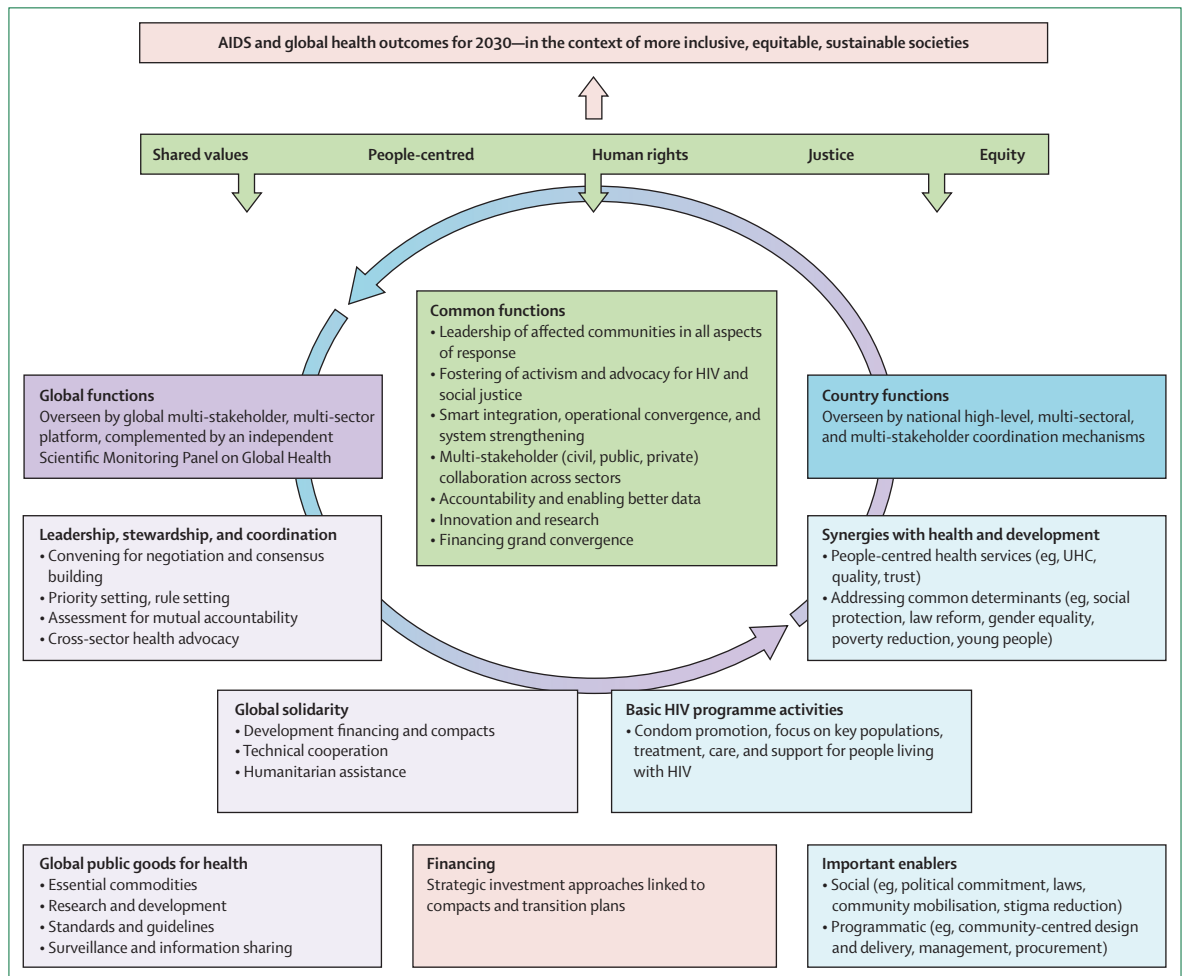


Figure 15: AIDS and global health framework



### Seven common actions: towards convergence and coherence in AIDS and global health

Effective AIDS responses share seven common and important actions that leverage both national and global support (figure 15). In this section, we discuss how these actions can be adopted by global health efforts to accelerate progress and how they offer opportunity for closer convergence on AIDS and global health, recognising that each country must find its optimum combination of strategies and enablers fit to its context.

#### *Leadership and engagement of affected communities in decision-making bodies*

The leadership and activism of people living with HIV and affected communities has driven many facets of the AIDS response—designing and assessing the first services, setting agendas, challenging trade policy, adopting services based on rights and community, generating political incentives for investing in the response, and more.

The AIDS movement's meaningful engagement mantra has been institutionalised in guiding principles—the Greater Involvement of People Living with HIV/AIDS—and in global and national AIDS governance bodies. This approach is shared with the disability movement's call for “nothing about us without us”<sup>178</sup> but is conspicuously absent in other areas of global health. Exceptions and powerful examples that can guide efforts do, however, exist. In Brazil, 50% of the national health council members are representatives from civil society,<sup>179</sup> whereas local councils provide for 50% representation by users of health services.<sup>180</sup> Good examples of user engagement in the rolling out of regional and national Universal Health Coverage schemes are found in Ghana and Thailand.<sup>181</sup> However, the scope for improvement is huge. The importance of engagement of a range of stakeholders in global governance for health has been recognised by the *Lancet*–Oslo Commission,<sup>2</sup> WHO, and others. Historically, AIDS movements arose organically, but investments to support civil society organisations and networks were also important.

Support for young people and building of a new leadership generation will be particularly crucial. Young people can lead and act together across broad social, economic, and environmental movements without losing the focus of their specific motivation for engagement. Leaders must respect and build on youth-led efforts to broaden meaningful youth participation in national, regional, and global processes. Youth organisations have created several participatory processes to harness the perspectives of their peers in policy making on specific issues, such as AIDS and sexual and reproductive health, as well as larger matters such as accountability in the post-2015 sustainable development agenda.

#### *Fostering human rights and social justice activism*

A seat for affected communities at decision-making tables at all levels will only be effective if matched with targeted investments in civil society operations. Social

#### **Panel 3: Development assistance and human rights**

Although the necessity of action to remove harmful laws and policies has been made clear repeatedly by international bodies, many countries have not taken the necessary steps. Thus, the recommendations of the United Nations Development Programme Global Commission on HIV and the Law have not produced the strong legislative responses that were recommended. At the heart of the issue are the primacy of national sovereignty over universal norms and the appropriateness and ability of international partners working with local stakeholders to uphold the notion of universality. Because of the challenges presented by controversial political issues related to sex, drugs, and human rights, donor fatigue, and potential substantial increased costs of second-line and third-line antiretroviral therapies, politicians in many countries have been unwilling to take essential steps to reduce new HIV infections at the very time when these must be reduced. To the contrary, many have adopted hostile legislation that makes remedial steps much more difficult.

Some observers are urging political leaders to do more to protect their citizens from HIV by engaging with them and reforming laws that make such engagement difficult or impossible. In the case of national HIV programmes, which depend on external funding, some observers argue that donors are entitled to say that it is the obligation of countries in the midst of the HIV epidemic to help turn off the tap of new infections. Others suggest that it is wrong to impose conditions on development assistance, which should be given without conditionality because of the fundamental human rights to life and essential health care that are at stake.

Both donors and recipients have an understandable point of view. But unless the difference is resolved, the prospect that millions of people will die and suffer unnecessarily in this grave and potentially deteriorating situation must be faced because donor funds will not increase; costs of ARTs will substantially increase in the short run; and some recipient countries will not take the essential steps to reduce the numbers of infections because this involves what they see as an attempt by outsiders to impose culturally and religiously inappropriate requirements upon them.

But appeals to state sovereignty are unconvincing. State sovereignty now operates in the context of international responsibilities, as expressed in the UN Charter. As the present Secretary-General has repeatedly said, religious, cultural, and other views must be respected, but not where they seriously infringe the universal human rights belonging to individuals everywhere.

injustice—in the form of young women's vulnerability to HIV, unregulated tobacco and alcohol marketing, and poverty's effect on access to nutritional foods—kills on a grand scale. Promotion of human rights and enhancement of community dialogue is important to address harmful social norms, demand and deliver equitable services and sustainable solutions, and hold governments accountable for their commitments.

As such, activism constitutes a global public good, deserving investment commensurate with the role it plays in improving health outcomes. The independent, sometimes confrontational, legacy of activist organisations should be revitalised and nurtured because it provides political incentives for attention and support to AIDS and health. One promising development can accomplish this in all countries. The widespread penetration of technology—mobile phones, social media, and the data revolution—can facilitate grassroots organisation that links to transnational social movements in ways previously unimaginable.

The success of ART in prolonging the lives of people living with HIV led rights advocates to expand their efforts to frame access to ART as a human rights issue and demand access to drugs in court where the legal framework exists. In many cases, litigation also triggered more widespread legal reform. For example, pressure from civil society in South Africa generated by activists in the Treatment Action Campaign led the government to offer access to ART.<sup>182</sup> However, widespread availability of ART also led to a decrease in AIDS activism.

Drawing from the tactics employed by AIDS activists, a global health movement can transform a lofty set of global goals into community realisation. Civil society actors will need to find new ways to organise activism, while governments and international organisations must create conditions for activism—including direct investments, a free and open media, protection of rights to speech, and assembly to raise inconvenient truths—be they related to emerging pandemics or environmental health issues.

*Pursue smart integration, operational convergence, and system strengthening*

The infrastructure developed for HIV provides a platform to address other health issues in many contexts. Appropriate integration of services has the potential to increase the numbers of entry points into the health system, address patients' multiple needs while reducing their opportunity costs of attending services, enhance the reach, effectiveness, and sustainability of programmes, and generate wider health benefits.<sup>183</sup> A case study of Rwanda's experience with integration is presented in the appendix.

Evidence supporting both the feasibility and desirability of integrated HIV services is mounting. Results of initial studies show that HIV programmes have the potential to achieve significant economic benefits when brought together with other health delivery programmes.<sup>183</sup> Technical efficiency (the provision of services at low cost) and allocative efficiency (improved health outcomes at low cost) can be gained through economies of scope and scale, particularly for reproductive, maternal, and neonatal care and tuberculosis. In several settings, ART provided the first operational model of chronic care and could be better integrated with care for other chronic conditions.

Findings also suggest that no single approach to integration is adequate for all contexts.<sup>183</sup> Research on the right combination of approaches to optimise integration is scant. In some cases, however, efforts to integrate services for key populations are clearly counter-productive.<sup>184</sup> Integration of prevention and treatment services for sex workers, MSM, or injecting drug users with wider health services could in many contexts create barriers to access and reverse progress.

Individual national and subnational contexts must inform and guide choices about where to bring areas of a programme or service delivery together, minimising or at least not adding to their stigmatisation and discrimination, while also making effective and efficient use of resources.

*Build and reinforce multi-stakeholder collaboration across sectors*

As this report has emphasised, AIDS and health inequities cannot be addressed within the health sector alone, and a poor understanding of the structural determinants of epidemics can also deter the success of biomedical approaches.

A multisector and multi-stakeholder (civil, public, and private) response to AIDS and health requires national leadership to bring actors together, overcome barriers, enable policies, and scale up access to both treatment and prevention. Such a response to AIDS also calls for partners that are committed to all outcomes, rather than pursuing a selective focus on results in their own niches. Some countries have established national health councils that deal with all health issues within this framework of social determinants of health. A renewed push for broad civil society engagement will be essential.

Four governance-related issues need special attention at the international level. First, to act on the political determinants of the AIDS response necessitates stronger and more inclusive collaboration across sectors and actors than what is offered by existing arrangements. The multi-stakeholder platform proposed by the *Lancet*–University of Oslo Commission<sup>2</sup> is one option to strengthen the AIDS response and expand the space for participation of high-risk populations, civil society, and other non-state actors, including the private sector. This platform could possibly be expanded to serve a broader health agenda as experience is gained and its value is documented, although it might be more acceptable to create general health platforms afresh. Second, attention is needed to optimise the collaboration between the AIDS response and the different platforms that deal with gender, rights, women's and children's health, chronic diseases, and tuberculosis.<sup>185</sup> Third, the collaboration between the Global Fund and the UN response to AIDS should be harnessed further to support country-level operational convergence on AIDS and other health issues. Finally, given the plural system of actors in the AIDS response and in other areas of global health, independent monitoring and accountability mechanisms are essential.

*Strengthen accountability through joined-up mechanisms and better data on shared determinants*

Accountability is a broad, complex, and often elusive notion generated by a range of elements, including citizen activism, multi-stakeholder oversight, transparency, mechanisms for redress, and a rigorous monitoring framework.

Joined-up action in AIDS and global health demands more coherent and transparent accountability mechanisms that build on these innovations. Targets must be clear, a monitoring framework must capture progress on operational convergence and address shared determinants, and a process must be in place to effectively and inclusively review progress supported by more robust data systems.

In an effort to bolster accountability for resources and results, several multi-stakeholder health initiatives and partnerships have established independent monitoring mechanisms, such as the Independent Expert Review Group for the global “Every Woman Every Child” movement<sup>185</sup> and the Independent Monitoring Board for Polio Eradication. The World Bank and partners are developing approaches to closely monitor the performance of health systems through a window of result-based financing, which might also benefit from independent monitoring, not just at a country level but also at global level.

What is needed now is a global platform to establish an independent scientific panel that can act as a home for these types of initiatives for cross-cutting analysis. Such a panel would provide a focal point for independent, evidence-based monitoring, using the best science and knowledge from research institutions around the world (with academia in the lead, but with strong contribution from civil society). Competing or conflicting interests among stakeholders, and ongoing debates on methods of analysis makes the case for a worldwide monitoring mechanism to be science-based and independent.

Data serve as currency for accountability. Substantial enthusiasm has been generated in support of the UN Secretary-General’s call for a so-called data revolution.<sup>186</sup> Data on policy coherence and enabling policies for AIDS and health will raise additional challenges, both in terms of defining indicators and ensuring independence. The main challenge will be to follow the effect of policies and decisions on health in other sectors. The first job for the panel will therefore be to propose a monitoring framework that is sensitive to track progress in overcoming identified barriers from health and other sectors to enabling actions for health.

#### *Invest in and roll out innovation and implementation research*

The AIDS response has made greatest progress where the movement disrupted, rejected, or replaced models that stood in the way of access to treatment and prevention. To ensure that no one is left behind—and everyone is brought forward—investment in and institutionalisation of innovation is needed along the entire health-supply chain. This starts with service delivery at the local level and continues through the provision of social protection on a national scale, the integration of markets for regional and global approaches to drug production, and the redesign of the framework of incentives that drives research and development worldwide and where there is market failure.

To ramp up coordination and coherence among AIDS and health efforts demands innovative service delivery models and community partnerships. The community will be the face of the grand convergence in global health. Strengthening of community systems, task shifting, provision of patient-centred integrated services, as well as equipment and retainment of community health

workers will be essential. Importantly, implementation research on how to implement proven innovations in real-world contexts, delivered at scale, must guide priority setting and investment decisions.

The seventh action in the framework in figure 15, to sustainably finance the grand convergence, is covered in the next section. Across all seven actions, there is not only great scope for, but also considerable urgency, for the AIDS response to forge new alliances across sectors and find more effective models for collaboration. This will maximise synergies between HIV programmes and programmes grounded in other sectors and constituencies that pursue shared goals and deal with similar structural challenges.

### **Section 7. Towards long-term sustainable financing**

Over the past 30 years, funding for the AIDS response in low-income and middle-income countries has risen from a few million dollars to \$19 billion a year. Even during the global economic crisis of 2008–10, when financing from international sources levelled off temporarily, overall funding continued to increase thanks to growth in domestic contributions.<sup>187</sup> Although overall HIV spending in 2012 and 2013 was close to the pre-crisis rate of expansion of \$700 million a year, whether this growth rate will continue in the future is uncertain. More importantly, even if this rate of increase continues, it will be inadequate to meet the resource needs of a full AIDS response.

While HIV is often portrayed as well funded relative to other public health priorities, there has always been a funding gap relative to the resources needed to fully address the epidemic, and this gap is growing for several reasons. First, despite substantial reductions in the ART prices, the amount of resources needed for treatment has increased because of growth in the number of patients requiring such treatment, including more expensive second-line and third-line therapy. Second, programmatic needs for HIV prevention have expanded due to the availability of new, effective interventions, such as medical male circumcision and pre-exposure prophylaxis. Third, increases in domestic and external funding are not keeping pace with the overall cost of the AIDS response.

The feasibility for most generalised epidemic and hyper-epidemic countries to fully finance their AIDS response domestically through increased economic growth alone is low, and expected growth rates are far too low to meet resource needs of the ambitious UN Global Goals scenario. Here we examine possible funding sources beyond financing under the status quo and point to ways in which available funding can be used in a more efficient manner to reach more people with essential and effective services. We describe how robust transition plans and mechanisms for improved accountability could help to secure the required domestic and external resources. The building of adequate local capacity for financial planning,

management, and monitoring of HIV expenditures, where it is absent, must be part of the planning and preparations for the transition to greater national ownership and domestic funding of the AIDS response.

**Financing from domestic and external sources**

About half of the funding of HIV services are often reported to come from low-income and middle-income countries. Reported this way, one might get an overly optimistic picture of the situation, since domestically sourced funds are not fungible across countries. For example, some upper middle-income countries with modest burden, such as Brazil and Thailand, might spend substantial funds on HIV, masking the fact that large numbers of people with HIV live in settings where domestic financing is insufficient, especially in eastern and southern Africa. Low-income countries remain heavily dependent on international financing for their national HIV programmes, with domestic resources making up only 16% of HIV funding.<sup>25</sup> In some African countries, nearly all funding for treatment comes from

international sources, and a high percentage of support comes from the USA. In 2012, PEPFAR contributed almost half of all international HIV funds and was the largest contributor to the Global Fund.<sup>25</sup>

Ten countries have over one million people living with HIV: South Africa (6.3 million), Nigeria (3.2 million), India (2.1 million), Mozambique (1.6 million), Uganda (1.6 million), Kenya (1.6 million), Zimbabwe (1.4 million), Tanzania (1.4 million), Zambia (1.1 million), and Malawi (1.0 million). 61% of the world's 35 million cases live in these countries, and these countries have the largest number of annual new infections. According to the AIDSinfo online database, only South Africa and India provide more than half of current HIV spending (table 4). The remaining countries together contribute only 16% of the funding for HIV, yet account for 37% of all people living with HIV in low-income and middle-income countries. Moreover, in all ten countries, the AIDS response is incomplete and there is a large funding gap, which is projected to grow. For example, only 38% of all people living with HIV in these countries are now receiving ART—the most costly component of the AIDS response—yet eventually, all will need it.

Table 4 shows that domestic spending plays a small part in most key high-burden settings, that there are large gaps between actual spending and overall resource needs, and that additional funds need to be mobilised. Even if domestic financing increases further in line with countries' ability to pay and a greater political prioritisation given to HIV, large gaps will still need to be filled through development assistance.

While external aid for HIV needs to grow and be sustained in high-burden countries, countries also need to expand their own domestic financial contributions well above their present levels. Dependency carries risks of reliance on unpredictable and unsustainable external resources and potentially lower political commitment in recipient countries. Figure 16 shows how donor commitments increased between 2002 and 2008, then started to plateau and even decrease between 2008 and 2013. Actual disbursements have increased in the past few years, but not at the same rate of increase as pre-2008.

In the present circumstances of severe budgetary constraints faced by many high-income countries, overall reductions in the levels of development assistance,<sup>191</sup> and potential donor fatigue, it is by no means certain that financial resources will continue to flow to developing or even the least developed countries at their present level. However, funding needs to continue to rise, particularly as more patients are enrolled in lifelong ART. If international funding continues to flatten, the additional costs must be borne by the countries.

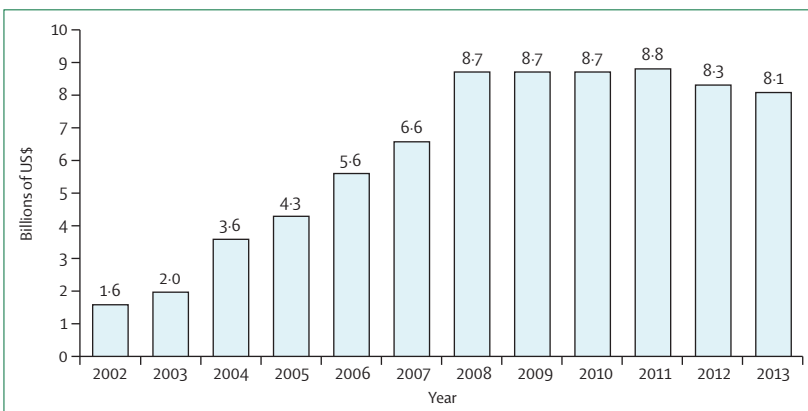
**Returns on investment and other incentives for domestic investment**

Although some countries have plans to raise funds through insurance schemes and taxes, many will not be

	Epidemic category	Number of people living with HIV	Proportion of people living with HIV who receive ART (%)	Proportion of HIV funding from domestic public sources (%)
South Africa	Hyper	6.3 million	42%	83%
Nigeria	General	3.2 million	20%	21%
India*	Concentrated	2.1 million	36%	88%
Kenya	General	1.6 million	41%	18%
Mozambique	Hyper	1.6 million	32%	5%
Uganda	General	1.6 million	38%	13%
Tanzania	General	1.4 million	37%	40%
Zimbabwe	Hyper	1.4 million	48%	14%
Zambia	Hyper	1.1 million	52%	6%
Malawi†	Hyper	1.0 million	46%	13%

Source: UNAIDS aidsinfoonline.org. \*For India, a budgetary split found in a World Bank Project Appraisal Document for India's National AIDS Control Project.<sup>188</sup> †For Malawi, domestic spending was reported in their recent NHA.<sup>189</sup>

**Table 4: Domestic spending by top ten countries with highest numbers of people living with HIV**



**Figure 16: International HIV commitments (enacted amounts) from donor governments, 2002–13**

Source: Financing the response to HIV in low-income and middle-income countries: international assistance from donor governments in 2013.<sup>190</sup>

able to substantially expand funding without a major shift of priorities towards HIV. There are several reasons why countries should spend more to deliver HIV services and other primary health-care services. First, the costs associated with the failure to address HIV now will be higher in the future as more infections occur and ultimately more people living with HIV will require care and treatment services. Second, ramping up health systems to address HIV will benefit other health priorities such as tuberculosis control. Third, the returns on investment are high.<sup>192</sup>

Prevention of infections in the short term averts the need to pay the lifetime cost of HIV-related health care later. This is a benefit for people living with HIV, their families, and the funders of health care. Findings from several studies have also shown that HIV treatment enables people to stay healthy and in the workforce. For example, the investigators of a longitudinal study of a large South African cohort<sup>193</sup> found that patients who stop working because of AIDS usually return to employment after initiating ART, and patients who are able to initiate ART early in the course of their disease often avoid an interruption in employment. This is a benefit primarily to the households of people living with HIV. In very

high-burden settings, this might also benefit the economy more generally.

HIV treatment programmes consistently show the intervention to be cost effective when compared with GDP-based thresholds.<sup>194</sup> Findings from modelling studies<sup>195–197</sup> suggest that treatment remains cost effective even with more permissive criteria for treatment initiation. When survival gains are valued in monetary terms as part of a full-income approach to economic welfare—as was done for the *Lancet* Commission on Investing in Health report<sup>1</sup>—each life-year gained in low-income and middle-income countries has an estimated value equal to 2·3 times GDP per person.<sup>1</sup> When we apply this valuation to the incremental life-years gained in the three scenarios for increasing the AIDS response beyond current efforts, we find very large returns to scaling up. The modest scale-up in the Financial Constraints scenario leads to a total benefit of \$455 billion within 16 years. Scaling up to the Best Case scenario would generate an incremental welfare benefit of \$906 billion, and the most ambitious Global Goals scenario would generate benefits of \$1157 billion (table 5). In all epidemic categories and all scenarios, the average benefit–cost ratio for scaling up beyond current efforts is

	Hyper-endemic country	Generalised epidemic	Concentrated epidemic	IDU-driven epidemic	Total
GDP per person, US\$	\$4077	\$1666	\$4490	\$5824	\$3317
Discounted AIDS expenditure 2014–30, US\$					
Financial Constraint scenario	\$6 billion	\$14 billion	\$12 billion	\$2 billion	\$34 billion
Best Case scenario	\$31 billion	\$35 billion	\$25 billion	\$8 billion	\$99 billion
Global Goals scenario	\$54 billion	\$58 billion	\$19 billion	\$23 billion	\$154 billion
Discounted life-years gained from ART 2014–30, years					
Financial Constraint scenario	5 million	10 million	4 million	1 million	21 million
Best Case scenario	19 million	10 million	9 million	3 million	41 million
Global Goals scenario	25 million	17 million	11 million	8 million	60 million
Discounted life-years gained from infections prevented in 2014–30, years					
Financial Constraint scenario	15 million	26 million	6 million	2 million	49 million
Best Case scenario	38 million	22 million	9 million	6 million	75 million
Global Goals scenario	41 million	31 million	9 million	6 million	87 million
Discounted total life-years gained, years					
Financial Constraint scenario	20 million	36 million	10 million	3 million	69 million
Best Case scenario	57 million	32 million	17 million	9 million	116 million
Global Goals scenario	65 million	48 million	20 million	14 million	147 million
Welfare gain, US\$					
Financial Constraint scenario	\$191 billion	\$138 billion	\$107 billion	\$20 billion	\$455 billion
Best Case scenario	\$534 billion	\$124 billion	\$180 billion	\$69 billion	\$906 billion
Global Goals scenario	\$612 billion	\$185 billion	\$204 billion	\$157 billion	\$1157 billion
Benefit–cost ratio					
Financial Constraint scenario	32·2	9·8	9·1	8·2	13·3
Best Case scenario	17·3	3·5	7·2	8·2	9·1
Global Goals scenario	11·3	3·2	10·5	6·8	7·5

IDU=injecting drug use. GDP=gross domestic product. ART=antiretroviral therapy.

**Table 5: Welfare gains and benefit–cost ratios from modelled scenarios relative to Current Effort scenario, by epidemic category**



greater than three. The highest returns relative to investment are expected in hyper-endemic settings, where the benefit–cost ratio is 11–32, depending on the scenario. In all four epidemic settings, the returns to additional incremental funds in the Financial Constraint scenario are large (each dollar invested returns at least \$8 in welfare gain). Only for the concentrated epidemic setting does the Global Goals scenario have the highest benefit–cost ratio. Although there are diminishing returns to scaling up in most settings, the benefit–cost ratios are still favourable, even in the ambitious Global Goals scenario. These estimates of return on investment are also likely to be conservative, since they do not include health benefits associated with reduced morbidity. The methods behind these calculations are described in greater detail in the appendix.

Return on investment is not the only incentive for countries to invest additional domestic resources in their HIV programmes. Large investments in health systems, which are not always fully captured in models of HIV financial needs, are also needed to quickly scale up programmes

On the upside, these investments are synergistic with other priorities, such as universal health coverage and women’s and children’s health, as findings from studies in Ethiopia, Malawi, and Rwanda have shown.<sup>198,199</sup> Furthermore, although initiation of treatment and management of patients on ART relies on health-system capacity, it also

reduces the load on the system by preventing people from developing AIDS-related illnesses.

Countries with the highest HIV burden also need to tap into domestic budgets and development assistance for other health priorities and health systems.

**Increasing domestic outlays and the transition to greater self-reliance**

Brazil, Mexico, and Thailand are among the middle-income countries that have incorporated HIV services in their universal health coverage schemes. Rwanda, a low-income country, has started to cover HIV non-core services, such as opportunistic infections, in its insurance programmes; other countries, such as Namibia and Vietnam, are considering similar actions. However, these countries remain the exception: most other countries finance HIV services through supply-side efforts funded with health ministry budgets and with large infusions of external money from PEPFAR and the Global Fund.

Although most low-income and lower middle-income countries have historically contributed less than half of the funds for their HIV responses and domestic contribution levels at present are a very small portion (<20%) of the cost of a full HIV response, these countries could be doing more. Our theoretical rationale for this statement, which will be politically challenging to address in many countries is that first, many countries are underspending on health generally; second, some countries are not allocating enough of their health spending to HIV; and third, most countries are growing quickly and should be channelling a portion of new-found GDP into health, including HIV.

Table 6 shows domestic investment in the AIDS response by 12 sub-Saharan African countries. Most are spending less than the Abuja target<sup>204</sup> of 15% of government budget on health—only Rwanda and Zambia exceed it. Increases in health budget, with proportional increases in HIV spending, could help close the resource gap. Table 6 also reveals wide variation in the amount of domestic financing for HIV relative to the share of HIV/AIDS in the countries’ disease burden. In Botswana and Ethiopia, the proportion of health spending on HIV is larger than HIV/AIDS’ share of the total disease burden, but in other countries, allocations for HIV are less than a quarter of HIV/AIDS’ share of burden.

Benchmarking for health spending and the share of the health budget dedicated to HIV in 12 high-burden countries showed that generally, the countries would be able to finance a greater share of their total needs over the next 5 years if they met the proposed benchmarks.<sup>200</sup> In the scenario where countries meet both the Abuja target for health spending and increase the share of the health budget for HIV in line with disease burden, total average annual government expenditure on HIV would increase 2·5 times, from \$2·1 billion to \$5·1 billion a year, sufficient to cover 64% of total HIV financial needs in the 12 countries at the time. In reality, the degree to

	GDP per person, 2013 (US\$)*	Government spending on HIV relative to GDP (%)†	HIV share of total disease burden, 2005, DALYs‡	Health share of government spending, 2012 (%)§	Government spending on HIV as percentage of government spending on health (%)¶	Domestic HIV spending effort relative to share of disease burden
<b>Low-income countries</b>						
Ethiopia	\$540	0·13%	0·06	11·1%	7·0%	1·16
Kenya	\$1020	0·26%	0·22	5·9%	14·7%	0·67
Mozambique	\$590	0·11%	0·18	8·8%	3·8%	0·21
Rwanda	\$700	0·27%	0·12	22·1%	4·2%	0·35
Tanzania	\$700	0·03%	0·20	10·2%	1·2%	0·06
Uganda	\$630	0·29%	0·14	10·2%	14·7%	1·05
<b>Lower middle-income countries</b>						
Cote d’Ivoire	\$1180	0·05%	0·13	8·0%	3·0%	0·23
Nigeria	\$1690	0·05%	0·07	6·7%	2·6%	0·37
Zambia	\$1540	0·17%	0·28	16·4%	3·7%	0·13
<b>Upper middle-income countries</b>						
Botswana	\$7140	1·85%	0·44	8·0%	61·6%	1·40
Namibia	\$5670	1·33%	0·39	13·9%	26·3%	0·67
South Africa	\$6620	0·33%	0·46	12·9%	8·3%	0·18

DALYs=disability-adjusted life-years. GDP=gross domestic product. \*International Monetary Fund World Economic Outlook April 2014.<sup>203</sup> †UNAIDS. GAP Report 2014.<sup>4</sup> ‡IHME Global Burden of Disease Study 2010 estimates of burden in 2005.<sup>202</sup> §WHO national health accounts.<sup>203</sup> ¶||Calculated from government health spending from WHO national health accounts<sup>203</sup> and government HIV spending.<sup>200</sup> ||Government HIV spending as a share of total government health spending divided by the share of disease burden (measured in DALYs) attributable to AIDS.

**Table 6: HIV spending in selected sub-Saharan African countries<sup>200</sup>**

which countries are capable of increasing funding for HIV and the cost-effectiveness of HIV interventions compared with the cost-effectiveness of addressing other disease priorities will be other important considerations to complement this analysis.

Under these circumstances, the financial implications for the major external sources, including PEPFAR and the Global Fund could be profound, reducing overall external funding requirements and releasing resources from middle-income countries that could be reallocated to cover persisting gaps in the low-income countries. This relocation of funds could amount to as much as \$1.5 billion annually for the 12 high burden countries studied.

To meet the increasing demands for domestic funding for HIV and health, governments are exploring a range of traditional and innovative sources. Traditional mechanisms include value added taxes and surcharges on wages and on private and corporate income. Innovative approaches range from special levies on air travel, cell phone usage, and alcohol and tobacco consumption, to earmarked taxes on petroleum and new-found mineral wealth, and various forms of borrowing.<sup>205–207</sup>

### Efficiency gains

Countries should also be able to make their HIV spending more efficient, thereby delivering a larger volume of essential services for the same amount of money. Results of several ongoing studies<sup>208,209</sup> suggest that higher unit costs and lower efficiencies occurred in settings with complex governance of facilities and low numbers of people served. To address these problems, promising approaches to enhance technical efficiencies included improved targeting of resources to hot spots and high-risk populations, strong monitoring and accountability, simple management structures and expanded training, and innovative models for staffing and service delivery.

### Financing from development partners and funding transitions

PEPFAR and the Global Fund are shifting their policies to encourage greater country financial buy-in along with more explicit guidelines for affordable and sustainable domestic financial contributions. In 2014, the Global Fund adopted a new funding model that effectively accelerates the transition of a large number of middle-income countries away from external financing to domestic self-sufficiency. 15 countries outside of Africa have transitioned, and another two (Albania and Thailand) are expected to gradually transition between now and 2017. The Global Fund is further encouraging greater domestic financing through its so-called counterpart funding requirements and by giving countries incentive payments for stronger domestic efforts.<sup>210</sup>

This new emphasis on domestic financing requires greater examination of how much of the overall cost of a strong AIDS response can be met with domestic

financing, without causing undue harm to other national priorities, and whether resource gaps for HIV could be bridged through a combination of greater domestic financing and reallocation of international assistance to the countries where it is needed most.

Middle-income countries are already increasingly using domestic investments to fund their AIDS responses. Brazil, China, India, Russia, and South Africa, for example, increased their domestic HIV spending by more than 120% between 2006 and 2011. South Africa quadrupled its domestic investment in HIV between 2006 and 2011, and the government has resolved to provide ART free of charge to at least 80% of people eligible for treatment by the end of 2015. However, challenges and risks associated with this generally favourable trend exist. First, there is a continuing challenge to see that HIV spending reaches the poor and vulnerable: middle-income countries are now home to three-quarters of the 1.3 billion persons living in poverty worldwide.<sup>211</sup> Second, health systems are fragile in some middle-income countries, and the transition from external to domestic funding therefore needs to be carefully managed to ensure that the health-care needs of people living with HIV, especially those treated with ART, continue to be met. Finally, it is important to note that support for interventions aimed at high-risk populations in many middle-income countries in Asia and eastern Europe, especially MSM and injecting drug users, comes mostly from the Global Fund and PEPFAR because stigma and discrimination has stood in the way of national authorities being willing to fund these programmes. This failure of national leaders to engage with the drivers of the epidemic could undermine efforts to control the HIV epidemic in these countries. Strong policy dialogue and advocacy are needed to ensure that this does not happen.

### Compacts for monitoring and accountability

The Global Fund, PEPFAR, UNAIDS, and country governments are testing new ways to help make these funding transitions smoother, more affordable, and more sustainable for countries. One promising approach is the country compact: an explicit agreement between a low-income or middle-income country government and key external funding partners. Compacts should be grounded in country plans, include programmatic and financial commitments made and agreed upon by all parties, and specify mechanisms to incentivise all actors to honour their commitments. When based on a carefully crafted national plan that implements local conditions, culture, and institutions, compacts also have the potential to free countries from rigid external programme approaches of the past. The GAVI Vaccine Alliance and the US Millennium Challenge Corporation are already using such compacts.

Some of the most elaborate of these compacts to date, such as the Partnership Framework Implementation Plans between South Africa and PEPFAR, are showing

promise for both increasing government ownership of the entire national response and alignment by a major development partner.

In a review of 21 compacts from 13 countries,<sup>212</sup> including the South Africa Partnership Framework Implementation Plans, the ideal agreement was found to include: a medium term duration of about 5 years; key financing or high-level political signees; clear and monitorable financial targets for all parties, including donors and the national government; inputs from economic and epidemiological data, costed HIV strategies, and trusting dialogue; reliable monitoring and evaluation systems, including transparent processes for tracking financial commitments; and a series of binding incentives, including penalties and rewards, to meet financial commitments or for failing to attain them. Compacts will continue to evolve as roles between donors and countries change and as the discussion develops on which services supported under some donor HIV programmes (eg, mental health and treatment or prevention for comorbidities) are essential components of the HIV service delivery packages provided by country governments.

Similar compacts should be developed both within countries, between national parliaments and ministries of finance, and those in charge of the national AIDS response. These essential monitoring and accountability systems should embrace the same principles, as these will be important for sustaining national commitments to defeating AIDS.

### **Building capacity for HIV financial planning, monitoring, and accountability**

Strong local capacity is important to design, monitor, and implement country-donor HIV compacts and shift the balance of control and funding toward national actors. In several countries, including India,<sup>213,214</sup> Kenya,<sup>215</sup> and Vietnam,<sup>216</sup> national economists and financial planners have begun to make the projections needed to underpin compacts and their financial targets. The skills, models, and data they are using must be supported in the coming years to ensure that the national AIDS leadership team is effectively managing the HIV funding situation, examining past spending patterns and results, and looking forward to medium-term targets and funding requirements.

National actors must have access to the relevant data, analytical methodology, and software. The introduction of PEPFAR's Expenditure Analysis initiative in 2012<sup>217</sup> and the roll-out of the Global Fund's new Annual Financial Reporting tool,<sup>218</sup> in addition to both organisations' increased commitment to transparency, should provide countries with real-time information about their spending patterns. Additionally, country leaders and their technical teams must be able to track and analyse domestic HIV spending. This can be done relatively easily in countries with reliable public sector financial management, such as South Africa, and in countries where national health insurance funds have

developed comprehensive databases for tracking HIV services and spending, such as Mexico and Thailand. In other countries with weaker overall government financial reporting, special studies will be needed to ensure that domestic HIV spending is counted alongside external funding. International organisations can play an important part in working with countries to build their domestic capacities to synthesise and analyse data from expenditure tracking systems.

Finally, countries need to keep investing in systems to track HIV expenditures and analyse spending patterns and unit costs to improve efficiency in both the allocation and use of resources. Much is being done to assess spending at the point of HIV service delivery, especially for treatment,<sup>219</sup> and this needs to be complemented by similar studies of so-called above-facility costs. As more low-income and middle-income countries invest in systems for health-priority setting and health-technology assessment,<sup>220</sup> new HIV interventions should be reviewed for inclusion in universal health-care coverage packages, as part of the vision of the AIDS response.

### **Sustainably financing the grand convergence**

AIDS-related advocacy has raised the profile of health care as a priority area for national expenditure. The 2001 Abuja target of allocating 15% of government budgets for health<sup>204</sup> was endorsed in large part because of African leaders' desire to address AIDS and malaria more urgently and effectively. In responding to the AIDS epidemic, the G8's international funding for these priorities also expanded in the early 2000s. Health spending in African Union member states has increased substantially, from \$30.7 billion in 2001 to \$106.6 billion in 2011—although the proportion of government versus private spending changed very little during this time.<sup>204</sup> As of 2012, only seven African Union countries had reached the Abuja target.<sup>221</sup> Without undermining the important role that international resources for AIDS and health will continue to have, most development actors recognise that sustainability rests on continued scale up of domestic resources.<sup>1,222,223</sup>

The development and adoption of financial investment plans for health will provide a foundation for the long-term commitment to health and wellbeing. Investment in the building, financing, and ensuring of equitable access to national social protection schemes in particular, has the potential to deliver on a broad range of outcomes, such as reduction of HIV vulnerability, improvement of access to health services, poverty reduction, and restoration of dignity and security.<sup>224,225</sup>

The emergence of the broader health agenda provides an opportunity to consider a fund for health and to further refine the Global Fund partnership model to strengthen the engagement of countries and civil society in decision making processes; to increase the role of low-income and middle-income countries in the delivery of both financial assistance and technical expertise; and to maximise the

synergies of investment in health systems towards global targets on HIV, other infectious diseases, and emerging chronic diseases.

While countries are taking up the leadership challenge of building more sustainable responses, global solidarity will remain an essential component in the pursuit of better health outcomes. Development assistance, despite the reduction in its relative scale as compared to growing needs, will remain essential, provided that these funds are channelled to contribute to both a healthy planet and healthy people. Novel solutions must also be found to ensure adequate financing of health

outcomes in middle-income countries if the international community wishes to genuinely spearhead growth and economic prosperity globally.

## Section 8. Conclusion and recommendations

The main findings of our analysis are listed in panel 4. The next phase of the AIDS response must focus sharply on both prevention and treatment and on people who are at highest risk. The AIDS response must continue to be rooted in human rights and scientific evidence, build on the gains that have been made, and maximise synergies with other spheres of

### Panel 4: Main findings of this Commission

Enormous gains have been made in the ability to control the HIV epidemic, protecting millions of people from infection and AIDS-related illness and death; however, there are concerning signs of complacency and setbacks in countries and populations that had previously made good progress.

Investments in HIV prevention, particularly for populations at high risk and in hot spots for HIV transmission, have been consistently insufficient, resulting in continuing high rates of HIV infection and mortality in these populations.

Antiretroviral therapy (ART) fundamentally changed the course of the epidemic; first by substantially reducing mortality from HIV infection, and then through its contribution to HIV control strategies.

More must be done to scale up what is known to work, in particular to reach populations at highest risk, to broadcast widely innovative best practices, and to address weaknesses and learn from mistakes; country-specific solutions are needed to overcome barriers to equitable and sustainable access to HIV prevention, tests, treatment, and care.

Not enough attention has been paid to HIV tests and viral load monitoring, standardisation of treatment regimens, the securing of more affordable second-line and third-line antiretroviral drugs, quality of chronic HIV care and services, or other needs of people living with HIV (eg, comorbidities and non-communicable diseases in an ageing population, non-discrimination, education, employment, social protection, wellbeing).

Service delivery platforms used for HIV care and for the prevention of mother-to-child transmission of HIV can be substantially strengthened through operational convergence with other health issues, whereas many of the innovations of the AIDS response can generate momentum for the wider global health community.

Human rights have played an important part in the achievements of the AIDS response; however, far more progress is needed to address stigma and discrimination, remove punitive laws, and create enabling legal and social environments for the AIDS response; some countries have

chosen to let sex workers, men who have sex with men, transgender people, and people who inject drugs die of AIDS rather than change the laws and policies that prevent them from accessing the services they need.

AIDS activism and civil society remain important for the AIDS response; as such, activism constitutes a global public good, deserving investment commensurate with the role it has in improving health outcomes; there is a need to revitalise the legacy of activist organisations, as it provides political incentives to show results for AIDS and health.

Research has been essential to advance HIV control and treatment, as this was a completely new disease; the AIDS response has been characterised by its unusually prompt adaptation of new scientific evidence, products, and interventions in its programmes; the scientific community has also been intimately involved in global and national strategy development, advocacy, implementation, and evaluation—perhaps more than in other health issues.

The results from our modelling of several investment scenarios are sobering; a continuation of what are already intensive efforts means new HIV infections in 2020 will be higher than in 2015 in three epidemic categories (the exception is concentrated epidemics); mortality will rise fast in many populations.

In many high-burden countries with strong and growing economies, a transition to financial self-sufficiency could be achievable; some of the most affected countries in Africa will continue to need major international support for many years to control the HIV epidemic.

The return on investment in the fight against AIDS is high; when survival gains are valued in monetary terms as part of a full income approach to economic welfare—as was done for the *Lancet* Commission on Investing in Health report<sup>1</sup>—each life-year gained in low-income and middle-income countries has an estimated value equal to 2.3 times GDP per person; our modelling suggests that scaling up to the most ambitious scenario would generate benefits of US\$1157 billion between now and 2030.

health and development. While mobilising additional resources, the AIDS response must remain true to its multi-stakeholder roots.

Only a massive and rapid expansion of a comprehensive AIDS response in the next five years can achieve the highly ambitious UN goal of ending AIDS as a public health threat by 2030. A continuation of what are already major efforts would allow achievements to reverse, such that by 2020, there will be more new HIV infections, more AIDS-related deaths, and an escalation of costs to keep the epidemic under control. However, if the most is made of this 5-year window of opportunity, HIV transmission could be reduced to low endemic levels, AIDS-related mortality greatly reduced, and mother-to-child transmission virtually eliminated by 2030. But success is by no means certain, and gains to date are fragile. At the same time, a long-term view is needed to ensure sustainability of achievements. Taking the necessary action immediately will save millions of lives and generate multiple dividends for global health and sustainable development—a sustainable convergence towards equity in health and beyond health. A win on HIV requires equity. People's health and planetary health require equity. The road to equity demands change.

The path to a world where AIDS is no longer a public health threat, as set out in this report, should be a major part of the post-2015 development agenda. The AIDS response is a forerunner of what needs to become standard practice to meet the challenges of global health and sustainable development: a whole-of-society approach with much more interconnected and inclusive governance and actions across sectors, driven by science, innovation, and human rights. The AIDS response pioneered the formal engagement of civil society, affected communities, and other non-state actors and is a powerful pathfinder for a health sector that needs to become more inclusive.

### Key recommendations

We have consolidated the actions set out in this report into seven key recommendations. Many of our recommendations are also relevant to efforts towards other priority health challenges (eg, sexual and reproductive health, non-communicable diseases, tuberculosis). Several recommendations address the need for collaboration and new alliances for AIDS and health. To seize these opportunities—and increase resources, science, and innovation—the goal to end AIDS as a public health threat by 2030 and other ambitious Sustainable Development Goals may be achieved.

We acknowledge that our recommendations need quantifiable targets to measure and assess their implementation. Although beyond the scope of this Commission, implementation is an important next step, as is the establishment of an independent monitoring and assessment system.

### *Urgently escalate AIDS efforts, get serious about HIV prevention, and continue expanding access to treatment*

There is an urgent need to do more and to do better now. All aspects of a comprehensive AIDS response must be funded, and resources must be targeted to where they will make the greatest difference. Safeguarding achievements and advancing the trajectory of the end of the AIDS epidemic as a public health threat demand serious consideration of combination HIV prevention and further expansion of treatment programmes.

Prevention must be at the heart of the AIDS response. To reach all those people in need, combination prevention (biomedical, behavioural, and structural interventions) must be tailored and targeted to marginalised communities and populations most at risk of HIV infection: there is no one-size-fits-all approach. All countries with generalised or concentrated epidemics and countries that are hyper-endemic should produce a detailed long-term HIV prevention strategy and implementation plan, similar to Kenya's HIV prevention roadmap published in 2014 (table 7).<sup>110</sup>

Access to testing and treatment must be greatly expanded and point-of-care viral load monitoring rolled out as core strategies to end AIDS-related mortality and as essential components of combination prevention. The primary goal of treatment is to prevent death from HIV infection; primary outcome measures should be retention in care and sustained virological suppression. Affected communities and population groups should be involved in the development and implementation of HIV prevention and treatment programmes. UNAIDS is well placed to compare and disseminate best practices.

New frameworks and practical arrangements are required to secure the long-term supply of affordable first-line, second-line, and third-line ART and equipment to measure viral load, including low-income countries transitioning to middle-income status. These frameworks and arrangements must also address where intellectual property protection arrangements are necessary.

Improvement of quality, efficiency, and integration of health services for the provision of lifelong HIV care are important treatment-related priorities. So, too, are monitoring and addressing the consequences of long-term ART, such as the high burden of chronic complications and non-communicable diseases in people taking ART.

Investment is needed in cross-sector interventions (eg, community system strengthening, economic empowerment of young women through cash transfers, and reducing gender-based violence) that are proven to prevent new infections and reduce AIDS-related mortality.

### *Mobilise more resources, spend efficiently, and emphasise sustainability*

Much larger sums of money need to be mobilised and allocated to reduce the number of new HIV infections and AIDS-related deaths, delivery capacity must be expanded, and demand must be stimulated. The high



	Available biomedical intervention		Behavioural intervention	Structural intervention
	Community setting	Facility setting		
People living with HIV	Linkage to care; treatment adherence; elimination of mother-to-child-transmission; condom use	ART regardless of CD4 cell count; elimination of mother-to-child-transmission; viral load monitoring	Positive Health, Dignity and Prevention programme; condom use; couple HIV testing and counselling; disclosure to partner	Zero stigma and discriminatory by-laws; universal access to HIV and sexual and reproductive health services
Discordant couples	Linkage to care; treatment; adherence to treatment; elimination of mother-to-child-transmission; condom use; couple HIV testing and counselling	Treatment for HIV prevention; pre-exposure prophylaxis; elimination of mother-to-child-transmission; voluntary medical male circumcision; family planning	Motivation for HIV negative partner to stay negative; couple HIV testing and counselling; disclosure to partner; partner prevention; EBAN programme	Assisted partner(s) notification for people living with HIV
Young women at risk (15–24 years)	HIV testing and counselling; screening of sexually transmitted infections, including anal screening, HPV screening; education; female and male condom use; family planning; emergency contraception	Post-exposure prophylaxis	Healthy choices from evidence-informed behavioural interventions; Positive Health, Dignity and Prevention programme; condom use; couple HIV testing and counselling; risk perception training	Programmes to keep girls in school; Conditional economic support (IMAGE study); campaigns to motivate those tested HIV negative to adopt risk reduction and stay negative; gender-based violence-reduction programmes; messages on intergenerational sex
Sex workers	Male and female condom use; frequent and regular HIV testing and counselling, screening for sexually transmitted infections, including anal and cervical cancer screening	Treatment for sexually transmitted infections, treatment for HIV regardless of CD4 count, pre-exposure prophylaxis, post-exposure prophylaxis, elimination of mother-to-child-transmission, HPV vaccines	Campaigns and recognition to motivate those tested HIV negative to adopt risk reduction and stay negative; Positive Health, Dignity and Prevention programme; alcohol and substance abuse programmes	100% condom use policy; recognition of negative status since previous HIV test; promote human rights; safe spaces; Conditional economic support (IMAGE); gender-based violence-prevention programmes; health care providers and police sensitivity
MSM	Male condom use, lubricants; frequent and regular HIV testing and counselling; screening and vaccines for sexually transmitted infections and HPV	Treatment for sexually transmitted infections; ART-regardless of CD4 count; pre-exposure prophylaxis; post-exposure prophylaxis; elimination of mother-to-child-transmission; HPV vaccines	Campaigns to motivate those tested HIV negative to adopt risk reduction and stay negative; Positive Health, Dignity and Prevention programme; reduction of number of partners; alcohol and substance abuse programmes	Human rights protection of MSM; safe spaces or drop-in centres; social support mPowerment; psycho-social support mechanisms; gender-based violence-prevention programmes; health-care providers and police sensitivity trainings
People who inject drugs	Peer education on HIV prevention; comprehensive service package for people with infectious disease; regular HIV testing and counselling, sexual, and reproductive health care, tuberculosis, hepatitis B virus, and hepatitis C virus screening; sterile needle and syringe kits; safe disposal of used injecting equipment; integrated ART and medically assisted therapy	Sexually transmitted infections screening and treatment, elimination of mother-to-child transmission, family planning; ART, regardless of CD4 cell count, pre-exposure prophylaxis, post-exposure prophylaxis; needle and syringe exchange programmes; medically assisted therapy, tuberculosis treatment, vaccination for hepatitis B virus and hepatitis C virus	Addiction counselling on alcohol and substance abuse; safer injecting practices; reduction of sexual partners; Positive Health, Dignity and Prevention programme; motivate for HIV negative status; gender-based-violence-prevention programmes	Key population policy Review; human rights protection of people who inject drugs, safe spaces or drop-in centres; legal aid; psychosocial support mechanisms or mental Health; health-care providers and police sensitivity trainings; basic hygiene kits and child-care support for women who use or inject drugs; economic enhancement via vocational training and income-generating activity
Prison communities and other uniformed forces	Frequent and regular HIV testing and counselling; sexually transmitted infection screening	HIV testing and counselling; sexually transmitted infection and HPV screening; sexually transmitted infection treatment; ART, regardless of CD4 count, post-exposure prophylaxis; elimination of mother-to-child transmission	Risk reduction for HIV negative testers; Positive Health, Dignity and Prevention programme; evidence-informed behavioural interventions (eg, START)	Psycho social support mechanisms for reintegration; review of prison policy on HIV prevention to include condom use, pre-exposure prophylaxis, safe injecting needles, and conjugal visits

Biomedical, behavioural, and structural interventions for high-risk priority populations in high-incidence clusters. A different set of interventions are recommended for the general population and bridging populations in this cluster). ART=antiretroviral therapy. HPV=human papilloma virus. MSM=men who have sex with men. Source: Kenya HIV prevention revolution road map: count down to 2030.<sup>110</sup>

**Table 7: Prevention interventions for high-risk populations in high-incidence areas of Kenya**

For the **Positive Health, Dignity guidelines** see [http://www.unaids.org/sites/default/files/media\\_asset/20130802\\_Positive\\_Health\\_Dignity\\_Prevention\\_Operational\\_Guidelines\\_0.pdf](http://www.unaids.org/sites/default/files/media_asset/20130802_Positive_Health_Dignity_Prevention_Operational_Guidelines_0.pdf)

For the **EBAN programme** see <http://www.sph.emory.edu/departments/bshe/research-resources/serodiscordant-couples/>

For the **IMAGE study** see [http://www.wits.ac.za/academic/health/publichealth/radar/socialinterventions/10453/intervention\\_with\\_microfinance\\_for\\_aids\\_gender\\_equity.html](http://www.wits.ac.za/academic/health/publichealth/radar/socialinterventions/10453/intervention_with_microfinance_for_aids_gender_equity.html)

For the **mPowerment project** see <http://mpowerment.org/>

For more on the **START study** see <http://i-base.info/start-study/>

level of efforts made at present costs \$19 billion annually, whereas achieving the UN goal of ending AIDS as a public health threat by 2030 will cost \$36 billion annually. Affected countries with financial capacity can and should fund more of their AIDS responses, allocating funds for HIV on the basis of the share of HIV in the total disease

burden and health spending as a share of public revenues.

However, the need for international funding to support highly affected low-income countries is still great, particularly in sub-Saharan Africa. The UN goal, or even a continuation of current efforts would cost significant

proportions of GDP and total government expenditure in the most affected countries (0·6%–2·1% of GDP and 30·4%–67·1% of government health expenditure from 2014–2030 to fund HIV programmes). These estimates do not take into account much needed efficiency gains, including more targeted interventions as recommended above, as well as major management efficiencies. However, even under the most optimum resource allocation and management, the financial burden on the most affected African countries remains exorbitant.

Explicit results-based agreements (or compacts) between governments and international funding partners are recommended for all countries where the AIDS response is dependent on external assistance. A similar national compact is needed between the parliament, ministry of finance, and the institutions in charge of HIV control, even in the absence of external funding. Such funding schemes will need systems for monitoring HIV expenditure targets and actual spending. The transition from external dependence to greater self-sufficiency, from stand alone to progressively integrated programming, and from a highly stigmatised to a more tolerant legal environment should be important goals in all countries. Over the next 5 years, countries should commit to a reduction in the incidence of HIV infection and of HIV-related deaths as a basis for sustaining and increasing both domestic and external investment.

Ministries must integrate services at the site-level to identify cost savings across disease processes, while ensuring that marginalised populations at high risk of HIV infection have access to services and prevention. Engagement with and support of the private sector is essential to enhance mid-level management, strengthen information systems, consolidate procurement systems, and identify further duplicative costs.

Maximisation of the synergies of health investment for progress across the Sustainable Development Goal's health agenda, building on the model of the Global Fund, should help to advance the AIDS and health agenda.

### *Demand robust accountability, transparency, and better data*

The establishment of robust accountability mechanisms at national and sub-national levels requires a process of transparent data review and a mechanism to take results into policy making, including any necessary remedial action. UNAIDS is the logical global institution to monitor such accountability.

Investment in detailed epidemiological data collection of high-risk population groups, including behavioural and response data, is an imperative in all countries affected by the HIV epidemic. There is nothing new about this recommendation; it is unacceptable that it has yet to become standard practice. Data need to be more widely disseminated and better packaged to identify gaps in the AIDS response and to influence HIV policy and programme decision making.

### *Forge new paths to uphold human rights and address criminalisation, stigma, and discrimination*

A crucial lesson from the HIV epidemic (and from global health generally) is that the commitment expressed in universal human rights to enjoyment by everyone of the highest available standard of physical and mental health can be fulfilled. To uphold and defend the human rights of people with infections or people at most risk of infection can bring down the rates of infection and death. These lessons are still hard to learn and teach. Many people die when these lessons are not learned.

Practical solutions are needed to expedite changes in the laws, policies, and public attitudes that violate the human rights of vulnerable populations who might be at particularly high risk of HIV infection, such as women, sex workers, MSM, transgender people, injecting drug users, prisoners, and migrants. UNAIDS and its co-sponsors should redouble their efforts in this respect. Work at a local level is key to increase inclusivity and community involvement. The creation of safe service havens for marginalised and vulnerable groups at high risk of HIV is a crucial step to ensure that no one is denied access to health care and HIV prevention.

### *Reinforce and renew leadership and engagement of people living with HIV*

Renewed and increased leadership and political commitment at the highest level—from heads of state and governments, parliaments, and other legislative bodies—must ensure that difficult policy choices are made and funding secured for the AIDS response. Equally important is leadership from communities, civil society, activists, businesses, religious institutions, teachers, and health-care professionals, among others. The future rests on how the decisions and investments affect the lives and inheritance of young people at present. Young people can become the engines of democratic engagement in local and national platforms and strategies that aim to optimise responses to HIV and other health and development priorities.

To strengthen the space for community responses to HIV and to find new ways to meaningfully involve affected populations in decision making are essential to increase the likelihood that national systems will develop in ways that are responsive to the needs of people living with and at risk of HIV infection.

To build and sustain the political incentives that drive meaningful action, AIDS activism and civil society must be reinvigorated through dedicated investment and linking with other groups, movements, and academia active in health, gender equality, development, and human rights.

### *Invest in research and innovation in all facets of the AIDS response*

Research must remain a fundamental component of the AIDS response. The long-term goals of an effective

vaccine and a cure remain priorities. Additional research priorities include: epidemiological studies to identify and monitor high-risk populations and hot spots; socio-behavioural research to understand the drivers and structural determinants of HIV transmission; and implementation research to improve the efficiency and effectiveness of interventions. High priority innovations include diagnostic tools to identify acute HIV infection, a rapid viral load test, and long-lasting ART formulations to simplify treatment and make pre-exposure prophylaxis more practical. Also required is country-specific delivery research of the common needs of people with both HIV and other diseases (eg, human resources, laboratory, pharmaceuticals, procurement distribution systems) to eliminate parallel systems and to ensure that existing systems are additive with other donor funding and the country's own investment.

Ministries of health should consider establishing mentoring relationships with in-country academic centres, experienced NGOs, and the corporate sector.

The evidence base on best-buy policy and programmatic interventions that deliver gains across several Sustainable Development Goals needs to be strengthened and multi-sectoral coalitions built around these interventions.

#### *Promote more inclusive, coherent, and accountable governance for AIDS and health*

New alliances across sectors and more effective models for collaboration are required between HIV programmes and other sectors and constituencies that pursue shared goals. Mobilisation of action on the multi-sectoral structural determinants of health will require powerful advocacy, political will, and stronger collective accountability.

This Commission supports the establishment of a global multi-stakeholder and multi-sector platform to bring political urgency and technical capacity to enable the determinants of health to be addressed. An Independent Scientific Monitoring Panel on Global Health, with a strong base in academic institutions and centres of excellence, could review progress in addressing barriers to health equity, inform the public, and feed into formal global governance processes that affect health, as proposed by The *Lancet*–University of Oslo Commission on Global Governance for Health.

Existing institutions must also find workable solutions to secure the long-term supply of and access to the global public goods necessary to achieve equity in health, including disease surveillance systems and affordable, quality-assured drugs.

## Conclusion

The question is no longer whether the fight against AIDS can be won; the only questions are: will it be won—and when? The answers to these questions will eventually depend on the decisions made by leaders and

institutions at all different levels, in all sectors and parts of society, and on the personal choices people make in their private lives.

#### Contributors

PP was Chair of the Commission. The first draft of this report was written by a core writing team led by PP, which also included SSAK, RH, HL-Q, KB, JS, SR, TR, SM, MD, EG, CW, NK, JM, MS; the writing team met regularly during the course of the Commission's work. All members of the Commission contributed to the ideas and recommendations and to the structure of the report. All authors approved the final submitted version of the report. The report was prepared under the general direction of PP.

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Commissioners Mark Dybul (Global Fund to Fight AIDS, Tuberculosis and Malaria) and Aaron Motosoledi Ministry of Health, South Africa) led Working Group 2 on the lessons of the AIDS response for global health while Commissioners Edwin Cameron (Constitutional Court of South Africa); Helen Clark (represented by Mandeep Dhaliwal (United Nations Development Programme (UNDP)) and Svitlana Moroz (All-Ukrainian Network of People Living with HIV) served as members. Additional Working Group members Chris Beyrer (Johns Hopkins University and The International AIDS Society), Agnes Binagwaho (Ministry of Health, Rwanda; Harvard Medical School; Dartmouth Geisel School of Medicine), Tracy Carson (Office of the Global AIDS Coordinator, US Department of State), Fenton Ferguson (Ministry of Health, Jamaica), Anand Grover (Lawyers Collective), Dominique Kerouedan (Paris School of International Affairs, Sciences Po), Selina Lo (*The Lancet*), Jane Miller (UK Department for International Development), Carole Presern (The Global Fund to Fight AIDS, Tuberculosis and Malaria), K Sujatha Rao (Former Government of India) and Speciosa Wandira-Kazibwe (President's Office, Uganda) provided insights captured by writer Robin Gorna (AIDS Strategy, Advocacy and Policy (ASAP)), Chip Heath (Stanford University) and Mike Rios (17 Triggers) facilitated a face-to-face meeting of the group using "trigger mapping" methodology to highlight country success game changers.

Commissioner Helen Clark (UNDP) led Working Group 3 on global health architecture with Commissioners Mark Dybul (represented by Marijke Wijnroks (Global Fund to fight AIDS, Tuberculosis and Malaria), Donald Kaberuka (African Development Bank), Ed Ngoksin and Alessandra Nilo providing inputs as Working Group members. Additional Working Group members Brian Brink (Anglo American plc), Andrew Cassels (Graduate Institute, Geneva), Tania Dussey-Cavassini (Swiss Federal Office of Public Health), Helene D Gayle (CARE USA), Geeta Rao Gupta (the United Nations Children's Fund (UNICEF)) (represented by Craig McClure (UNICEF)), Anders Nordström (Ministry for Foreign Affairs, Sweden) and Deborah von Zinkernagel (UNAIDS, then Office of the Global AIDS Coordinator, US Department of State)

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#### References

- 1 Jamison DT, Summers LH, Alleyne G, et al. Global health 2035: a world converging within a generation. *Lancet* 2013; **382**: 1898–955.
- 2 Ottersen OP, Dasgupta J, Blouin C, et al. The political origins of health inequity: prospects for change. *Lancet* 2014; **383**: 630–67.
- 3 CDC. Pneumocystis pneumonia—Los Angeles. *MMWR Weekly* 1981; **30**: 1–3.
- 4 UNAIDS. The Gap Report. Geneva: Joint United Nations Programme on HIV/AIDS, 2014: 123.
- 5 WHO. Global Health Observatory data: HIV/AIDS. <http://www.who.int/gho/hiv/en/> (accessed Feb 4, 2015).
- 6 UNAIDS. Political declaration on HIV and AIDS: intensifying our efforts to eliminate HIV and AIDS. Geneva: Joint United Nations Programme on HIV/AIDS, 2011.
- 7 UNAIDS. 90-90-90—an ambitious treatment target to help end the AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS, 2014.
- 8 UNAIDS. Ambitious treatment targets: writing the final chapter of the AIDS epidemic. Geneva: Joint United Nations Programme on HIV/AIDS, 2014.
- 9 UNAIDS. Fast track: ending the AIDS epidemic by 2030. Geneva: Joint United Nations Programme on HIV/AIDS, 2014.
- 10 UNAIDS. 20th International AIDS Conference, 2014. <http://www.unaids.org/en/resources/campaigns/aids2014> (accessed Feb 4, 2015).
- 11 Global Commission on HIV and the Law. HIV and the Law: risks, rights & health. New York: Secretariat, Global Commission on HIV and the Law, 2012.
- 12 The aids2031 Consortium. AIDS: taking a long-term view. Upper Saddle River, NJ: Financial Times Press, 2011.
- 13 UNAIDS. 2013 global fact sheet. Geneva: Joint United Nations Programme on HIV/AIDS, 2013.
- 14 UNAIDS. 2014 progress report on the Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: Joint United Nations Programme on HIV/AIDS, 2014.



- 15 UNAIDS. Global AIDS response progress reporting 2015. [http://www.unaids.org/sites/default/files/media\\_asset/C2702\\_GARPR2015guidelines\\_en.pdf](http://www.unaids.org/sites/default/files/media_asset/C2702_GARPR2015guidelines_en.pdf) (accessed March 6, 2015).
- 16 Statistics South Africa. <http://www.statssa.gov.za/> (accessed March 6, 2015).
- 17 GBD 2013 Mortality and Causes of Death Collaborators. Global, regional, and national age-sex specific all-cause and cause-specific mortality for 240 causes of death, 1990–2013: a systematic analysis for the Global Burden of Disease Study 2013. *Lancet* 2015; **385**: 117–71.
- 18 UNAIDS–Lancet Commission. London meeting discussion paper. AIDS post-2015: a catalyst for convergence and results. Geneva: Joint United Nations Programme on HIV/AIDS, 2014. [http://www.unaids.org/sites/default/files/media\\_asset/20150528\\_DiscussionPaper\\_2016-2021\\_CRP1.pdf](http://www.unaids.org/sites/default/files/media_asset/20150528_DiscussionPaper_2016-2021_CRP1.pdf) (accessed June 1, 2015).
- 19 National Department of Health, South Africa. The 2012 National Antenatal Sentinel HIV & Herpes Simplex Type-2 Prevalence Survey in South Africa. Pretoria: Department of Health, 2014.
- 20 Shisana O, Rehle T, Simbayi LC, et al. South African national HIV Prevalence, Incidence and Behaviour Survey, 2012. Cape Town: HSRC Press, 2014.
- 21 UNAIDS. AIDSinfo: epidemiological status of HIV epidemic in Uganda. Geneva: Joint United Nations Programme on HIV/AIDS, 2014.
- 22 National AIDS and STI Control Programme, Ministry of Health, Kenya. Kenya AIDS Indicator Survey 2012: preliminary report. Nairobi: Ministry of Health, 2013.
- 23 US Centers for Disease Prevention and Control. HIV among African Americans. <http://www.cdc.gov/hiv/risk/raciaethnic/aa/facts/index.html> (accessed Feb 5, 2014).
- 24 Van Renterghem H, Colvin M, De Beer I, et al. The urban HIV epidemic in eastern and southern Africa: need for better KYE/KYR to inform adequate city responses. AIDS 2012, XIXth International AIDS Conference, July 22-27, Washington DC, USA. New Epidemic Frontiers, Oral Poster Discussion, Track C. <http://pag.aids2012.org/Session.aspx?s=262> (accessed May 10, 2015).
- 25 UNAIDS. Global report: UNAIDS report on the global AIDS epidemic 2013. Geneva: Joint United Nations Programme on HIV/AIDS, 2013.
- 26 Abdool Karim Q, Abdool Karim SS, Singh B, Short R, Nxongo S. Seroprevalence of HIV infection in rural South Africa. *AIDS* 1992; **6**: 1535–39.
- 27 Shisana O, Rehle T, Simbayi LC, et al. South African national HIV prevalence, incidence, behaviour and communication survey 2008: a turning tide among teenagers? Cape Town: HSRC Press, 2009.
- 28 Human Sciences Research Council. South African national HIV Prevalence, Incidence and Behaviour Survey, 2012. Pretoria: Human Sciences Research Council, 2014.
- 29 Women living with HIV speak out against violence. [http://www.unaids.org/sites/default/files/media\\_asset/womenlivingwithhivspeakout\\_en.pdf](http://www.unaids.org/sites/default/files/media_asset/womenlivingwithhivspeakout_en.pdf) (accessed March 25, 2015).
- 30 WHO. Multi-country study on women's health and domestic violence against women. Geneva: World Health Organization, 2005.
- 31 Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *Lancet* 2010; **376**: 41–48.
- 32 WHO. Global and regional estimates of violence against women: prevalence and health effects of intimate partner violence and non-partner sexual violence. Geneva: World Health Organization, 2013.
- 33 Karamagi CAS, Tumwine JK, Tylleskar T, Heggenhougen K. Intimate partner violence against women in eastern Uganda: implications for HIV prevention. *BMC Public Health* 2006; **6**: 284.
- 34 Fonck K, Leye E, Kidula N, Ndinya-Achola J, Temmerman M. Increased risk of HIV in women experiencing physical partner violence in Nairobi, Kenya. *AIDS Behav* 2005; **9**: 335–39.
- 35 Jewkes R, Dunkle K, Koss MP, et al. Rape perpetration by young, rural South African men: prevalence, patterns and risk factors. *Soc Sci Med* 2006; **63**: 2949–61.
- 36 Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, Harlow SD. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Soc Sci Med* 2004; **59**: 1581–92.
- 37 Maman S, Mbwambo JK, Hogan NM, et al. HIV-positive women report more lifetime partner violence: findings from a voluntary counseling and testing clinic in Dar es Salaam, Tanzania. *Am J Public Health* 2002; **92**: 1331–37.
- 38 Nyamayemombe C, Mishra V, Rusakaniko S, Benedikt C, Gwazane M, Mukweza P. The Association between violence against women and HIV: evidence from a national population-based survey in Zimbabwe. Zimbabwe Working Papers, No. 4. Calverton, MD: ICF Macro, 2010.
- 39 US Department of State. 2009 country reports on human rights practices. Washington, DC: United States Department of State, Bureau of Democracy, Human Rights and Labor, 2010.
- 40 Shannon K, Strathdee SA, Goldenberg SM, et al. Global epidemiology of HIV among female sex workers: influence of structural determinants. *Lancet* 2015; **385**: 55–71.
- 41 Pham QD, Wilson DP, Law MG, Kelleher AD, Zhang L. Global burden of transmitted HIV drug resistance and HIV-exposure categories: a systematic review and meta-analysis. *AIDS* 2014; **28**: 2751–62.
- 42 Baral S, Sifakis F, Cleghorn F, Beyrer C. Elevated risk for HIV infection among men who have sex with men in low- and middle-income countries 2000–2006: a systematic review. *PLoS Med* 2007; **4**: e339.
- 43 De Boni R, Veloso VG, Grinsztejn B. Epidemiology of HIV in Latin America and the Caribbean. *Curr Opin HIV AIDS* 2014; **9**: 192–98.
- 44 Public Health England. HIV in the United Kingdom: 2014 Report. [https://www.gov.uk/government/uploads/system/uploads/attachment\\_data/file/377194/2014\\_PHE\\_HIV\\_annual\\_report\\_19\\_11\\_2014.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/377194/2014_PHE_HIV_annual_report_19_11_2014.pdf) (accessed Jan 23, 2015).
- 45 The Kirby Institute. HIV, viral hepatitis and sexually transmissible infections in Australia. Annual Surveillance Report, 2013. <http://www.ashm.org.au/images/Media/ASR2013.pdf> (accessed Feb 5, 2015).
- 46 International AIDS Society. HIV incidence rose 13.5-fold in MSM in Poland from 2000 to 2011. <http://www.iasociety.org/Default.aspx?pageId=5&elementId=15698> (accessed Feb 5, 2015).
- 47 Johnson AS, Hall HI, Hu X, Lansky A, Holtgrave DR, Mermin J. Trends in diagnoses of HIV infection in the United States, 2002–2011. *JAMA* 2014; **312**: 432–34.
- 48 Itaborahy LP, Zhu J. State-sponsored homophobia. A world survey of laws: criminalisation, protection and recognition of same-sex love. London: International Lesbian, Gay, Bisexual, Trans and Intersex Association, 2013.
- 49 Poteat T, Diouf D, Drame FM et al. HIV risk among MSM in Senegal: a qualitative rapid assessment of the impact of enforcing laws that criminalize same sex practices. *PLoS One* 2011; **6**: e28760.
- 50 UNDP. Punitive laws limit access to HIV prevention and care services in Asia Pacific. Bangkok: United Nations Development Programme, 2010.
- 51 United Nations Office on Drugs and Crime. World Drug Report 2014. [http://www.unodc.org/documents/wdr/2014/World\\_Drug\\_Report\\_2014\\_web.pdf](http://www.unodc.org/documents/wdr/2014/World_Drug_Report_2014_web.pdf) (accessed Feb 4, 2015).
- 52 UNAIDS. Global Report: UNAIDS report on the global AIDS epidemic 2012. Geneva: Joint United Nations Programme on HIV/AIDS, 2012: 34.
- 53 Harm Reduction International. The global state of harm reduction towards an integrated response. London: Harm Reduction International, 2012.
- 54 Aghaizu A, Brown AE, Nardone A, et al. HIV in the United Kingdom 2013 Report: data to end 2012. London: Public Health England, 2013.
- 55 The Center for HIV Law and Policy. Lipscombe CK. Tylenol and an ICE pack: an inadequate prescription for HIV/AIDS in immigration detention centers. *11 Cardozo Pub L Pol'y & Ethics J* 2013; **529**.
- 56 Jones A, Cremin I, Abdullah F, et al. Transformation of HIV from pandemic to low-endemic levels: a public health approach to combination prevention. *Lancet* 2014; **384**: 272–79.
- 57 American Psychological Association. Additional HIV/AIDS information. Teaching tip sheet: attitudes and behavior change. <http://www.apa.org/pi/aids/resources/education/attitude-change.aspx> (accessed Feb 6, 2015).
- 58 Sendziuk P. Harm reduction and HIV-prevention among injecting drug users in Australia: an international comparison. *Can Bull Med Hist* 2007; **24**: 113–29.

- 59 Bailey RC, Moses S, Parker CB, et al. Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet* 2007; **369**: 643–56.
- 60 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.
- 61 Gray RH, Kigozi G, Serwadda D, et al. Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet* 2007; **369**: 657–66.
- 62 WHO. Global update on the health sector response to HIV, 2014. Geneva, Switzerland: World Health Organisation, 2014.
- 63 Abdool Karim Q, Abdool Karim SS, Frohlich JA, et al. Effectiveness and safety of tenofovir gel, an antiretroviral microbicide, for the prevention of HIV infection in women. *Science* 2010; **329**: 1168–74.
- 64 Baeten JM, Donnell D, Ndas P. Antiretroviral prophylaxis for HIV prevention in heterosexual men and women. *N Engl J Med* 2012; **367**: 399–410.
- 65 Grant RM, Lama JR, Anderson PL, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med* 2010; **363**: 2587–99.
- 66 Thigpen MC, Kebaabetswe PM, Paxton LA, et al. Antiretroviral preexposure prophylaxis for heterosexual HIV transmission in Botswana. *N Engl J Med* 2012; **367**: 423–34.
- 67 Choopanya K, Martin M, Suntharasamai P, 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.
- 68 Cohen MS, Chen YQ, McCauley M, et al. Prevention of HIV-1 infection with early antiretroviral therapy. *N Engl J Med* 2011; **365**: 493–505.
- 69 Connor EM, Sperling RS, Gelber R, et al. Reduction of maternal-infant transmission of human immunodeficiency virus type 1 with zidovudine treatment. Pediatric AIDS Clinical Trials Group Protocol 076 Study Group. *N Engl J Med* 1994; **331**: 1173–80.
- 70 Jackson JB, Musoke P, Fleming T, et al. Intrapartum and neonatal single-dose nevirapine compared with zidovudine for prevention of mother-to-child transmission of HIV-1 in Kampala, Uganda: 18-month follow-up of the HIVNET 012 randomised trial. *Lancet* 2003; **362**: 859–68.
- 71 UNAIDS. 2013 progress report on the Global Plan towards the elimination of new HIV infections among children by 2015 and keeping their mothers alive. Geneva: Joint United Nations Programme on HIV/AIDS (UNAIDS), 2013.
- 72 Remme M, Siapka M, Vassall A, et al. The cost and cost-effectiveness of gender-responsive interventions for HIV: a systematic review. *J Int AIDS Soc* 2014; **17**: 19228.
- 73 World Bank. Malawi and Tanzania research shows promise in preventing HIV and sexually-transmitted infections. <http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/0,,contentMDK:22649337~pagePK:64165401~piPK:64165026~theSitePK:469372,00.html> (accessed May 11, 2015).
- 74 Ellsberg M, Arango DJ, Morton M, et al. Prevention of violence against women and girls: what does the evidence say? *Lancet* 2014; **14**: 61703–07.
- 75 Jewkes R, Nduna M, Levin J, et al. Impact of stepping stones on incidence of HIV and HSV-2 and sexual behaviour in rural South Africa: cluster randomised controlled trial. *BMJ* 2008; **337**: a506.
- 76 Wagman JA, Gray RH, Campbell JC, et al. Effectiveness of an integrated intimate partner violence and HIV prevention intervention in Rakai, Uganda: analysis of an intervention in an existing cluster randomised cohort. *Lancet Glob Health* 2015; **3**: e23–33.
- 77 Pronyk PM, Hargreaves JR, Kim JC, et al. Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet* 2006; **368**: 1973–83.
- 78 Kyegombe N, Abramsky T, Devries KM, et al. The impact of SASA!, a community mobilization intervention, on reported HIV-related risk behaviours and relationship dynamics in Kampala, Uganda. *J Int AIDS Soc* 2014; **17**: 19232.
- 79 MacQuarrie K, Eckhaus T, Nyblade L. HIV-related stigma and discrimination: a summary of recent literature. Geneva: UNAIDS, 2009.
- 80 Kidd R, Clay S, Chiiya C. Understanding and challenging HIV stigma: toolkit for action, 2nd edn. Hove: International HIV/AIDS Alliance, 2007.
- 81 Hurley SF, Jolley DJ, Kaldor JM. Effectiveness of needle-exchange programmes for prevention of HIV infection. *Lancet* 1997; **349**: 1797–800.
- 82 Groseclose SL, Weinstein B, Jones TS, Valleroy LA, Fehrs LJ, Kassler WJ. Impact of increased legal access to needles and syringes on practices of injecting-drug users and police officers—Connecticut, 1992–1993. *J Acquir Immune Defic Syndr Hum Retrovirol* 1995; **10**: 82–89.
- 83 McCord A, Himmelstine CL. Social protection and HIV global literature review: access to social protection and its impact on people living with and affected by HIV and their households. Geneva: International Labour Organisation, 2013.
- 84 Alcohol & Public Policy Group. Alcohol: no ordinary commodity—a summary of second edition. *Addiction* 2003; **98**: 1343–50.
- 85 WHO. Alcohol in developing societies: a public health approach. Geneva: World Health Organization, 2002.
- 86 Brandt AM. How AIDS invented global health. *N Engl J Med* 2013; **368**: 2149–52.
- 87 Friedman EA, Gostin LO, Buse K. Advancing the right to health through global organizations: the potential role of a Framework Convention on Global Health. *Health Hum Rights* 2013; **15**: E71–86.
- 88 Heywood M, Shija J. A global framework convention on health: would it help developing countries to fulfil their duties on the right to health? A South African perspective. *J Law Med Ethics* 2010; **38**: 640–46.
- 89 Gostin LO, Friedman EA, Buse K, et al. Towards a framework convention on global health. *Bull World Health Organ* 2013; **91**: 790–93.
- 90 Yamin AE. Editorial: promoting equity in health: what role for courts? *Health Hum Rights* 2014; **16**: E1–9.
- 91 Bollinger L, Stover J. Background paper on update of unit costs for UNAIDS global resource needs estimates. Glastonbury, CT: Futures Institute, 2014.
- 92 Avenir Health. Unit Costs Database. <http://www.avenirhealth.org/PolicyTools/UC/app.php> (accessed March 25, 2015).
- 93 UNAIDS. Country Reports to the UNAIDS Global AIDS Response Program Reporting (GARPR) system, 2014. <http://www.unaids.org/en/dataanalysis/knowyourresponse/countryprogressreports/2014countries> (accessed May 11, 2015).
- 94 The World Bank. Data: GNI per capita growth (annual %). <http://data.worldbank.org/indicator/NY.GNP.PCAP.KD.ZG> (accessed March 25, 2015).
- 95 Schwartländer B, Stover J, Hallett T, et al. Towards an improved investment approach for an effective response to HIV/AIDS. *Lancet* 2011; **377**: 2031–41.
- 96 Cohen JM, Smith DL, Cotter C, et al. Malaria resurgence: a systematic review and assessment of its causes. *Malar J* 2012; **11**: 122.
- 97 Tucker JD, Cohen MS. China's syphilis epidemic: epidemiology, proximate determinants of spread, and control responses. *Curr Opin Infect Dis* 2011; **24**: 50–55.
- 98 MacKellar DA, Hou SI, Whalen CC, et al. HIV/AIDS complacency and HIV infection among young men who have sex with men, and the race-specific influence of underlying HAART beliefs. *Sex Transm Dis* 2011; **38**: 755–63.
- 99 Beyrer C, Abdool Karim Q. The changing epidemiology of HIV in 2013. *Curr Opin HIV AIDS* 2013; **8**: 306–10.
- 100 Bezemer D, de Wolf F, Boerlijst MC, et al. A resurgent HIV-1 epidemic among men who have sex with men in the era of potent antiretroviral therapy. *AIDS* 2008; **22**: 1071–77.
- 101 Likatavicius G, Klavs I, Devaux I, Alix J, Nardone A. An increase in newly diagnosed HIV cases reported among men who have sex with men in Europe, 2000–6: implications for a European public health strategy. *Sex Transm Infect* 2008; **84**: 499–505.
- 102 Kron J. *New York Times* (New York), Aug 2, 2012. [http://www.nytimes.com/2012/08/03/world/africa/in-uganda-an-aids-success-story-comes-undone.html?\\_r=0](http://www.nytimes.com/2012/08/03/world/africa/in-uganda-an-aids-success-story-comes-undone.html?_r=0) (accessed March 25, 2015).
- 103 Santelli JS, Edelstein ZR, Mathur S, et al. Behavioral, biological, and demographic risk and protective factors for new HIV infections among youth in Rakai, Uganda. *J Acquir Immune Defic Syndr* 2013; **63**: 393–400.

- 104 Krishnan V. Is India's AIDS programme disintegrated? Feb 16, 2015. <http://www.livemint.com/Politics/n2svOmWwLqMsZuViMKwHmJ/Is-Indias-AIDS-programme-disintegrating.html> (accessed March 25, 2015).
- 105 Kalra A. *Reuters* (India), March 3, 2015. <http://in.reuters.com/article/2015/03/03/india-health-idINKBNOLY2CS20150303> (accessed March 25, 2015).
- 106 Ortblad KF, Lozano R, Murray CJL. The burden of HIV: insights from the Global Burden of Disease Study 2010. *AIDS* 2013; **27**: 2003–17.
- 107 Dowdle WR. The principles of disease elimination and eradication. *Bull World Health Organ* 1998; **76** (suppl 2): 22–25.
- 108 Whiteside A, Strauss M. The end of AIDS: possibility or pipe dream? A tale of transitions. *Afr J AIDS Res* 2014; **13**: 101–08.
- 109 Montaner JSG, Lima VD, Barrios R, et al. Association of highly active antiretroviral therapy coverage, population viral load, and yearly new HIV diagnoses in British Columbia, Canada: a population-based study. *Lancet* 2010; **376**: 532–39.
- 110 Kenya Ministry of Health. Kenya HIV prevention revolution road map: count down to 2030. June, 2014. [http://www.nacc.or.ke/attachments/article/418/Kenya\\_HIV\\_Prevention\\_Revolution\\_Road\\_Map.pdf](http://www.nacc.or.ke/attachments/article/418/Kenya_HIV_Prevention_Revolution_Road_Map.pdf) (accessed May 11, 2014).
- 111 Grant RM, Lama RJ, Andreson PL, et al. Preexposure chemoprophylaxis for HIV prevention in men who have sex with men. *N Engl J Med* 2010; **363**: 2587–99.
- 112 Pillay D, Fisher M. Primary HIV infection, phylogenetics, and antiretroviral prevention. *J Infect Dis* 2007; **195**: 924–26.
- 113 UNAIDS Programme Coordinating Board. UNAIDS-Lancet Commission Working Group 2 Discussion Paper. Thirty-third meeting Dec 17–10, 2013. [http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/pcb/2013/pcb33/agendaitems/01-UNAIDS-Lancet-Commission\\_Working\\_Group-2-Discussion-Paper-28Mar14.pdf](http://www.unaids.org/sites/default/files/en/media/unaids/contentassets/documents/pcb/2013/pcb33/agendaitems/01-UNAIDS-Lancet-Commission_Working_Group-2-Discussion-Paper-28Mar14.pdf) (accessed March 26, 2015).
- 114 Vassall A, Chandrashekar S, Pickles M, 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.
- 115 WHO. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection. Geneva: World Health Organization, 2013.
- 116 Raymond A, Hill A, Pozniak AJ. Large disparities in HIV treatment cascades between eight European and high-income countries—analysis of break points. *J Int AIDS Soc* 2014; **17** (suppl 3): 19507.
- 117 Bradley H, Hall HI, Wolitski RJ, et al. Vital signs: HIV diagnosis, care, and treatment among persons living with HIV—United States, 2011. *MMWR Morb Mortal Wkly Rep* 2014; **63**: 1113–17.
- 118 Ellman T. Demedicalizing AIDS prevention and treatment in Africa. *N Engl J Med* 2015; **372**: 303–05.
- 119 Abdoool Karim SS. Stigma impedes AIDS prevention. *Nature* 2011; **474**: 29–31.
- 120 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.
- 121 WHO. Global update on the health sector response to HIV, 2014. Geneva: World Health Organization, 2014.
- 122 Steen TW, Seipone K, Gomez FL, et al. Two and a half years of routine HIV testing in Botswana. *J Acquir Immune Defic Syndr* 2007; **44**: 484–88.
- 123 Sekandi JN, Sempeera H, List J, et al. High acceptance of home-based HIV counseling and testing in an urban community setting in Uganda. *BMC Public Health* 2011; **11**: 730.
- 124 Low C, Pop-Eleches C, Rono W, et al. The effects of home-based HIV counseling and testing on HIV/AIDS stigma among individuals and community leaders in western Kenya: evidence from a cluster-randomized trial. *AIDS Care* 2013; **25** (suppl 1): S97–107.
- 125 Dalal W, Feikin DR, Amolloh M, et al. Home-based HIV testing and counseling in rural and urban Kenyan communities. *J Acquir Immune Defic Syndr* 2013; **62**: e47–54.
- 126 Chamie G, Kwarisiima D, Clark TD, et al. Uptake of community-based HIV testing during a multi-disease health campaign in rural Uganda. *PLoS One* 2014; **9**: e84317.
- 127 UNAIDS. A short technical update on self-testing for HIV. Geneva: Joint United Nations Programme on HIV/AIDS, 2013.
- 128 Hamers RL, Wallis CL, Kityo C, et al. HIV-1 drug resistance in antiretroviral-naïve individuals in sub-Saharan Africa after rollout of antiretroviral therapy: a multicentre observational study. *Lancet Infect Dis* 2011; **11**: 750–59.
- 129 Gupta RK, Jordan MR, Sultan BJ, et al. Global trends in antiretroviral resistance in treatment-naïve individuals with HIV after rollout of antiretroviral treatment in resource-limited settings: a global collaborative study and meta-regression analysis. *Lancet* 2012; **380**: 1250–58.
- 130 UNITAID. HIV/AIDS Diagnostic Landscape, 3rd edn. Geneva: World Health Organization, 2013.
- 131 UNAIDS. Landmark HIV diagnostic access program will save \$150m and help achieve new global goals on HIV. Sept 25, 2014. <http://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2014/september/20140925prviralload> (accessed May 11, 2015).
- 132 WHO. Public health, innovation and intellectual property rights: report of the Commission on Intellectual Property Rights, Innovation and Public Health. Geneva: World Health Organization, 2006.
- 133 UNDP. Good practice guide: improving access to treatment by utilizing public health flexibilities in the WTO TRIPS Agreement. New York: United Nations Development Programme, 2010.
- 134 UNAIDS. Issue brief, 2012: the potential impact of Free Trade Agreements on public health. Geneva: Joint United Nations Programme on HIV/AIDS, 2012.
- 135 Abbott F, Flynn S, Correa C, et al. Using competition law to promote access to health technologies: A guidebook for low- and middle-income countries, 2014. Geneva: United Nations Development Programme, 2014.
- 136 The Global Fund to Fight AIDS, Tuberculosis and Malaria. The Equitable Access Initiative. Electronic report to the Board GF/B31/ER8, 2013. <http://infojustice.org/wp-content/uploads/2014/05/GF-B31-ER8-Board-Update-Equitable-Access-Initiative-Sent.pdf> (accessed May 11, 2015).
- 137 Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *Lancet* 2008; **372**: 764–75.
- 138 Kasenga F, Byass P, Emmelin M, Hurtig AK. The implications of policy changes on the uptake of a PMTCT programme in rural Malawi: first three years of experience. *Glob Health Action* 2009; **2**.
- 139 Delvaux T, Konan JP, Aké-Tano O, et al. Quality of antenatal and delivery care before and after the implementation of a prevention of mother-to-child HIV transmission programme in Côte d'Ivoire. *Trop Med Int Health* 2008; **13**: 970–79.
- 140 Chimbwandira F, Mhango E, Makombe S, et al. 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.
- 141 Legido-Quigley H, Montgomery CM, Khan P, et al. Integrating tuberculosis and HIV services in low- and middle-income countries: a systematic review. *Trop Med Int Health* 2013; **18**: 199–211.
- 142 Burua A, Musisi A, Tumwesigye B, et al. The integration of tuberculosis-HIV/AIDS care in 89 health facilities in Uganda. HIV/AIDS Implementers' Meeting; Kampala, Uganda, June 3–7, 2008. Abstract 554.
- 143 Janssens B, Van Damme W, Raleigh B, et al. Offering integrated care for HIV/AIDS, diabetes and hypertension within chronic disease clinics in Cambodia. *Bull World Health Organ* 2007; **85**: 880–85.
- 144 Mwangemi F, Lamptey P, Yonga G. Health Systems Strengthening: CVD/HIV Integration Initiative, FHI/Kenya Case Study, in Diabetes Leadership Forum 2010.
- 145 Melaku Z, Reja A, Rabkin M. Strengthening health systems for chronic care and non-communicable diseases (NCDs): leveraging HIV programs to support diabetes services in Ethiopia. 6th IAS Conference on HIV pathogenesis, treatment and prevention 2011; Rome, Italy; July 17–20, 2011. WEPDD0104 oral poster.
- 146 Druce N, Dickinson C, Attawell K, Campbell White A, Standing H. Strengthening linkages for sexual and reproductive health, HIV and AIDS: progress, barriers and opportunities for scaling up. London: Department for International Development, 2006.

- 147 National Institutes of Health. Trans-NIH AIDS research budget FY 2015. Bethesda, MD: National Institutes of Health, Department of Health and Human Services, 2014.
- 148 Kaiser Family Foundation. US federal funding for HIV/AIDS: the President's FY 2016 budget request. <http://kff.org/global-health-policy/fact-sheet/u-s-federal-funding-for-hiv-aids-the-presidents-fy-2016-budget-request/> (accessed May 30, 2015).
- 149 Maurice J. Profile: France's ANRS turns 25. *Lancet* 2013; **382**: e25.
- 150 Head MG, Fitchett JR, Cooke MK, Wurie FB, Hayward AC, Atun R. UK investments in global infectious disease research 1997–2010: a case study. *Lancet Infect Dis* 2013; **13**: 55–64.
- 151 Bill & Melinda Gates Foundation. What we do: HIV Strategy overview. <http://www.gatesfoundation.org/What-We-Do/Global-Health/HIV> accessed Nov 4, 2014).
- 152 AVAC. HIV prevention research & development investment in 2013. New York: AVAC, 2014.
- 153 Beyrer C, Sullivan PS, Sanchez J, et al. A call to action for comprehensive HIV services for men who have sex with men. *Lancet* 2012; **380**: 424–38.
- 154 Beyrer C, Malinowska-Sempruch K, Kamarulzaman A, Kazatchkine M, Sidibe M, Strathdee SA. Time to act: a call for comprehensive responses to HIV in people who use drugs. *Lancet* 2010; **376**: 551–63.
- 155 Lewin S, Glenton C, Oxman AD. Use of qualitative methods alongside randomised controlled trials of complex healthcare interventions: methodological study. *BMJ* 2009; **339**: b3496.
- 156 Auerbach J, Parkhurst J, Cáceres C and Keller K. Addressing social drivers of HIV/AIDS: some conceptual, methodological, and evidentiary considerations. New York: aids2031 Social Drivers Working Group, 2009.
- 157 Nyblade L, MacQuarrie K. Can we measure HIV/AIDS-related stigma and discrimination? Current knowledge about quantifying stigma in developing countries. Washington, DC: USAID, 2006.
- 158 Garcia-Moreno C, Jansen HA, Ellsberg M, et al. Prevalence of intimate partner violence: findings from the WHO multi-country study on women's health and domestic violence. *Lancet* 2006; **368**: 1260–69.
- 159 Hargreaves JR, Morison LA, Gear JS, et al. Assessing household wealth in health studies in developing countries: a comparison of participatory wealth ranking and survey techniques from rural South Africa. *Emerg Themes Epidemiol* 2007; **4**: 4.
- 160 Saunders JB, Aasland OG, Babor TF, de la Fuente JR, Grant M. Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction* 1993; **88**: 791–804.
- 161 Sanson-Fisher RW, Bonevski B, Green LW, D'Este C. Limitations of the randomized controlled trial in evaluating population-based health interventions. *Am J Prev Med* 2007; **33**: 155–61.
- 162 Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: extending horizons, envisioning the future. *Soc Sci Med* 2006; **62**: 1650–71.
- 163 Victora CG, Habicht JP, Bryce J. Evidence-based public health: moving beyond randomized trials. *Am J Public Health* 2004; **94**: 400–05.
- 164 Pawson R, Greenhalgh T, Harvey G, Walshe K. Realist review: a new method of systematic review designed for complex policy interventions. *J Health Serv Res Policy* 2005; **10** (suppl 1): 21–34.
- 165 Auerbach J. Transforming social structures and environments to help in HIV prevention. *Health Aff (Millwood)* 2009; **28**: 1655–65.
- 166 Cousens S, Hargreaves J, Bonell C, et al. Alternatives to randomisation in the evaluation of public-health interventions: statistical analysis and causal inference. *J Epidemiol Community Health* 2011; **65**: 576–81.
- 167 Case K, Ghys PD, Hallett TB, Porter K, eds. The 2013/2014 UNAIDS estimates methods: extending the scope and granularity of HIV estimates. *AIDS* 2014; **28** (suppl 4): S411–S542.
- 168 Rerks-Ngarm S, Pitisuttithum P, Nitayaphan S, et al. Vaccination with ALVAC and AIDSVAX to prevent HIV-1 infection in Thailand. *N Engl J Med* 2009; **361**: 2209–20.
- 169 Haynes BF, Gilbert PB, McElrath MJ, et al. Immune-correlates analysis of an HIV-1 vaccine efficacy trial. *N Engl J Med* 2012; **366**: 1275–86.
- 170 Gray GE, Allen M, Moodie Z, et al. Safety and efficacy of the HVTN 503/Phambili study of a clade-B-based HIV-1 vaccine in South Africa: a double-blind, randomised, placebo-controlled test-of-concept phase 2b study. *Lancet Infect Dis* 2011; **11**: 507–15.
- 171 Hansen SG, Ford JC, Lewis MS, et al. Profound early control of highly pathogenic SIV by an effector memory T-cell vaccine. *Nature* 2011; **473**: 523–27.
- 172 Tebas P, Stein D, Tang WW, et al. Gene editing of CCR5 in autologous CD4 T cells of persons infected with HIV. *N Engl J Med* 2014; **370**: 901–10.
- 173 Hütter G, Nowak D, Mossner M, et al. Long-term control of HIV by CCR5 Delta32/Delta32 stem-cell transplantation. *N Engl J Med* 2009; **360**: 692–98.
- 174 Barouch DH, Whitney JB, Moldt B, et al. Therapeutic efficacy of potent neutralizing HIV-1-specific monoclonal antibodies in SHIV-infected rhesus monkeys. *Nature* 2013; **503**: 224–28.
- 175 Buse K, Hawkes S. Health in the sustainable development goals: ready for a paradigm shift? *Global Health* 2015; **11**: 13.
- 176 Kickbusch I. Addressing the interface of the political and commercial determinants of health. *Health Promot Int* 2012; **27**: 427–28.
- 177 Sheikh K, Ranson MK, Gilson L. Explorations on people centredness in health systems. *Health Policy Plan* 2014; **29** (suppl 2): iii1–5.
- 178 Winter JA. The development of the Disability Rights Movement as a social problem solver. *Disabil Stud Q* 2003; **23**: 33–61.
- 179 Ministerio da Saude. Conselho Nacional De Saude. Composição. Brasília: Conselho Nacional de Saúde.
- 180 Cornwall A, Shankland A. Engaging citizens: lessons from building Brazil's national health system. *Soc Sci Med* 2008; **66**: 2173–84.
- 181 Rosenquist R, Golichenko O, Roosen T, Ravenscroft J. A critical player: the role of civil society in achieving universal health coverage. *Glob Health Gov* 2013; **6**.
- 182 Treatment Action Campaign. Fighting for our lives: the history of the Treatment Action Campaign 1998–2010. Cape Town: Treatment Action Campaign, 2010.
- 183 Sweeney S, Obure CD, Maier CB, Greener R, Dehne K, Vassall A. Costs and efficiency of integrating HIV/AIDS services with other health services: a systematic review of evidence and experience. *Sex Transm Infect* 2012; **88**: 85–99.
- 184 Druce N, Dickinson C, Attawell K, Campbell White A, Standing H. Strengthening linkages for sexual and reproductive health, HIV and AIDS: progress, barriers and opportunities for scaling up. London: Department For International Development, 2006.
- 185 Independent Expert Review Group on Information and Accountability for Women's and Children's Health. The iERG proposes a radical new vision for accelerating progress towards advancing women's and children's health. Sept 21, 2014. [http://www.who.int/woman\\_child\\_accountability/iERG/news/2014\\_iERG\\_report\\_press\\_release\\_sept2014.pdf](http://www.who.int/woman_child_accountability/iERG/news/2014_iERG_report_press_release_sept2014.pdf) (accessed May 11, 2015).
- 186 Independent Expert Advisory Group on a Data Revolution for Sustainable Development. A world that counts: mobilising the data revolution for sustainable development, 2014. <http://www.undatarevolution.org/wp-content/uploads/2014/12/A-World-That-Counts2.pdf> (accessed May 11, 2015).
- 187 Prasada Rao JVR. Latest funding trends in AIDS response. 20th International AIDS Conference; Melbourne, Australia; July 21, 2014. MOSY01.
- 188 World Bank Project Appraisal Document for India's National AIDS Control Project. <http://www.gtai.de/GTAI/Content/DE/Trade/Fachdaten/PRO/2013/05/Anlagen/PRO201305148008.pdf> (accessed May 11, 2014).
- 189 Ministry of Health, Government of Malawi. The Malawi national health accounts with subaccounts For HIV/AIDS, malaria, reproductive health, and child health for financial years 2009/10, 2010/11, and 2011/12. Lilongwe, Malawi: Ministry of Health, Department of Planning and Policy Development, 2014.
- 190 Kates J, Wexler A, Lief E. Financing the response to HIV in low- and middle-income countries: international assistance from donor governments in 2013. Menlo Park, CA: The Henry J Kaiser Family Foundation, 2014.
- 191 Organisation for Economic Co-operation and Development. Aid to poor countries slips further as governments tighten budgets. April 3, 2013. <http://www.oecd.org/newsroom/aidtopoor-countriesslipsfurtherasgovernmentstightenbudgets.htm> (accessed May 11, 2015).



- 192 The Global Fund to fight AIDS, TB, and Malaria. Willingness to Pay Policy. <http://www.theglobalfund.org/en/fundingmodel/counterpartfinancingwtp/willingnesstopay/> (accessed March 10, 2015).
- 193 Bor J, Tanser F, Newell M-L, Bärnighausen T. In a study of a population cohort in South Africa, HIV patients on antiretrovirals had nearly full recovery of employment. *Health Aff (Millwood)* 2012; **31**: 1459–69.
- 194 Bor J, Herbst AJ, Newell ML, Bärnighausen T. Increases in adult life expectancy in rural South Africa: valuing the scale-up of HIV treatment. *Science* 2013; **339**: 961–65.
- 195 Walensky RP, Wolf LL, Wood R, et al. When to start antiretroviral therapy in resource-limited settings. *Ann Intern Med* 2009; **151**: 157–66.
- 196 Walensky RP, Wood R, Ciaranello AL, et al. Scaling up the 2010 WHO HIV treatment guidelines in resource-limited settings: a model-based analysis. *PLoS Med* 2010; **7**: e1000382.
- 197 Eaton JW, Menzies NA, Stover J, et al. Health benefits, costs, and cost-effectiveness of earlier eligibility for adult antiretroviral therapy and expanded treatment coverage: a combined analysis of 12 mathematical models. *Lancet Glob Health* 2014; **2**: e23–34.
- 198 Farmer PE, Nutt CT, Wagner CM, et al. Reduced premature mortality in Rwanda: lessons from success. *BMJ* 2013; **346**: f65.
- 199 Rasschaert F, Pirard M, Philips MP, et al. Positive spill-over effects of ART scale up on wider health systems development: evidence from Ethiopia and Malawi. *J Int AIDS Soc* 2011; **14** (suppl 1): S3.
- 200 Resch S, Ryckman T, Hecht R. Funding AIDS programmes in the era of shared responsibility: an analysis of domestic spending in 12 low-income and middle-income countries. *Lancet Glob Health* 2015; **3**: e52–61.
- 201 International Monetary Fund. World Economic Outlook Database. Washington, DC: International Monetary Fund, 2014. <http://www.imf.org/external/pubs/ft/weo/2014/01/weodata/index.aspx> (accessed Oct 9, 2014).
- 202 Institute for Health Metrics and Evaluation (IHME). Global burden of disease: GBD compare. Seattle, WA: IHME, 2013.
- 203 WHO. National health accounts—estimates of national health expenditures. <http://www.euro.who.int/en/health-topics/Health-systems/health-systems-financing/activities/national-health-accounts-estimates-of-national-health-expenditures> (accessed May 11, 2015).
- 204 UNAIDS. Abuja +12: shaping the future of Africa. Geneva: UNAIDS, 2012.
- 205 Lievens T. Sustainable financing for HIV/AIDS: overview of six African country case studies. Oxford: Oxford Policy Management, 2011.
- 206 Lievens T, Kioko U. Sustainable financing for HIV/AIDS in Namibia—managing the transition towards a new AIDS financing strategy. Oxford Policy Management, Oxford: 2011.
- 207 NACC. Establishing a trust fund to ensure sustainable financing of HIV/AIDS in Kenya. Nairobi: National AIDS Control Council, 2014.
- 208 Bautista-Arredondo S, Sosa-Rubi S, Opuni M, et al. Assessing cost and technical efficiency of HIV prevention interventions in sub-Saharan Africa: the ORPHEA study design and methods. *BMC Health Serv Res* 2014; **14**: 599.
- 209 Chandrashekar S, Guinness L, Pickles M, et al. The costs of scaling up HIV prevention for high risk groups: lessons learned from the Avahan Programme in India. *PLoS One* 2014; **9**: e106582.
- 210 The Global Fund to Fight AIDS, Tuberculosis, and Malaria. Counterpart financing and willingness-to-pay. 2015. <http://www.theglobalfund.org/en/fundingmodel/counterpartfinancingwtp/> (accessed May 11, 2015).
- 211 Sumner A. Global poverty and the new bottom billion: three-quarters of the world's poor live in middle-income countries. September, 2010. Brighton: Institute of Development Studies, 2010.
- 212 Oomman N, Ryckman T. Guiding principles for compact development. Deconstructing donor-country compacts for sustainable financing for the HIV/AIDS response. Washington, DC: Results for Development Institute, 2013.
- 213 Department of AIDS Control, Government of India. National AIDS Control Programme Phase IV (2012–2017) strategy document. New Delhi: Government of India, 2012.
- 214 Hecht R, Mukherjee A, Skolnik R, Stover J, Thorien K. India: strategic options for the fourth National AIDS Control Program (NACP-IV). Washington, DC: Results for Development Institute, 2012.
- 215 Government of Kenya. Kenya HIV investment case summary. Nairobi: Government of Kenya, 2013.
- 216 Vietnam Ministry of Health. Optimizing Viet Nam's HIV response: an investment case. Hanoi: Government of Vietnam, 2014.
- 217 Goosby E. Strengthening effectiveness and efficiency in PEPFAR programs by improving analysis of expenditures. Washington, DC: PEPFAR, 2013.
- 218 The Global Fund. Global Fund guidelines for grant budgeting and financial reporting. Geneva: The Global Fund to Fight AIDS, Tuberculosis, and Malaria, 2014.
- 219 Tagar E, Sundaram M, Condliffe K, 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.
- 220 National Institute for Health and Care Excellence. International Decision Support Initiative. NICE International. November, 2014. <https://www.nice.org.uk/about/what-we-do/nice-international/nice-international-projects/international-decision-support-initiative> (accessed May 11, 2015).
- 221 WHO and African Health Observatory. Atlas of African health statistics 2014—health situation analysis of the African region. <https://www.who.int/en/publication/921/atlas-african-health-statistics-2014-health-situation-analysis-african-region> (accessed May 11, 2015).
- 222 Harmonization for Health in Africa. Investing in health for Africa. The case for strengthening systems for better health outcomes. Geneva: Harmonization for Health in Africa, 2011.
- 223 Avila C, Connor C, Amico P. Universal coverage of essential health services in sub-Saharan Africa: Projections of domestic resources. Bethesda, MD: USAID Health Finance & Governance Project, 2013.
- 224 Handa S, Halpern CT, Pettifor A, Thirumurthy H. The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15–25. *PLoS One* 2014; **9**: e85473. DOI:10.1371/journal.pone.0085473.
- 225 Cluver L, Boyes M, Orkin M, Pantelic M, Molwena T, Sherr L. Child-focused state cash transfers and adolescent risk of HIV infection in South Africa: a propensity-score-matched case-control study. *Lancet Glob Health* 2013; **1**: e362–70.