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# **A triple dividend: The health, social and economic gains from financing the HIV response in Africa**



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# About this report

This report presents findings from research conducted by Economist Impact to assess the health, demographic, social and economic impacts associated with different scenarios for financing the HIV epidemic across 13 selected countries in Sub-Saharan Africa. The sponsorship of UNAIDS towards this report is gratefully acknowledged. However, the findings and ideas expressed herein represent those of Economist Impact. They do not necessarily reflect the views and opinions of UNAIDS, nor do they engage the responsibility of UNAIDS.

The findings presented in this report draw on insights gathered from a literature review, expert interviews and analysis based on a custom impact model developed by Economist Impact to measure the impacts of different levels of funding towards the HIV response. The report has been produced by a team of researchers at Economist Impact including:

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# Executive summary

Global leaders have declared a commitment to accelerate progress in ending AIDS as a public health threat by 2030. The life-saving potential alone of achieving this goal should provide the impetus to dedicate adequate resources towards the HIV response. Furthermore, as this report highlights, the potential dividends from these investments are not limited to the lives saved. Rather, there is a triple dividend on offer across intricately connected policy priorities: health, social and economic. The findings from this report demonstrate how investments made to respond to the HIV epidemic could contribute to broader social and economic priorities, both through the knock-on implications of reduced mortality and morbidity and by freeing up resources to put towards these broader priorities.

Progress in advancing the global response to HIV and AIDS has, however, been lagging. Multiple recent global crises, including the covid-19 pandemic, have hampered efforts and placed strong pressure on financing for health. Restricting the movement of people to contain the spread of covid-19 has limited access to critical HIV prevention and treatment services, particularly among key and vulnerable populations. It has also exacerbated existing inequalities, making vulnerable groups less likely to access HIV and AIDS services. Simultaneously, governments have been forced by economic conditions and burgeoning debt levels to make

cuts in domestic funding for HIV and AIDS programmes. Without political commitment and bold action, these fiscal constraints will push targets to end the AIDS epidemic as a public health threat increasingly out of reach.

Urgent and collaborative action is needed to re-prioritise financing towards the HIV response, and health more broadly, on the global health and development agenda. Without this commitment and decisive action, the response to HIV will continue to lag, threatening to widen pre-existing health and socio-economic inequalities— young women, children and other vulnerable populations will pay the highest price. The human costs are striking in themselves, and a loud call for action. However, what is often overlooked is the subsequent impact of the HIV epidemic on societies and economies at large.

Failing to mobilise the required funding to achieve the targets noted within the 2021 Political Declaration on HIV and AIDS, and sustain the impact, leads to not only health, but also social and economic costs. To assess the magnitude of these costs, Economist Impact, supported by UNAIDS, has adopted a novel quantitative methodology. The analysis is conducted across thirteen selected countries in Sub-Saharan Africa. It takes a scenario in which 100% of the 2021 Political Declaration's funding targets are met and compares it to a business-as-usual (BAU)



scenario where funding levels post-2021 enable HIV service coverage levels to be maintained (but not expanded). The findings extend estimates from Avenir Health on the direct health-related outcomes of fully financing the HIV response. The resulting improvements in health and educational outcomes give rise to economic gains which are modelled through a human capital impact pathway that estimates the productivity impacts on current and future generations.

Our research and analysis point towards a number of key findings.

Firstly, our findings demonstrate that increasing investments towards the HIV response have direct implications on the spread of new HIV infections, and therefore contribute towards the goal of ending AIDS as a public health threat. These findings reinforce previous analysis that has informed the targets that have been set.

- **Increasing investments towards the HIV response could: significantly curb growth in new infections, particularly in countries with a high burden of disease.** Analysis conducted by Avenir Health demonstrates that meeting HIV funding targets could reduce the number of new HIV infections by between 40% to up to 90% depending on the study country, compared to BAU funding levels. The impacts are more pronounced in high-burden countries such as Mozambique and South Africa where, respectively, 810,000 and 1.35m new HIV infections could be averted between 2022 and 2030.

- **Increasing investments towards the HIV response could: reduce the spread of new HIV infections among vulnerable populations, including young girls and women. Young girls and women are particularly at risk of contracting HIV.** In South Africa, young girls aged 15-19 are four times more likely to become infected with HIV compared to the rest of the population. Directing increased investment towards the HIV response could substantially benefit this vulnerable group. For example, our findings show that if the full funding targets for HIV are met in South Africa, the female population aged 15-19 could account for almost 15% of the total reduction in new HIV infections between 2022 and 2030, despite making up less than 5% of the total population. These findings demonstrate how investments in the HIV response could address existing gender disparities. Although our findings focus specifically on the impact of fully funding the response to HIV among young girls and women, these impacts may extend to other key populations, including men who have sex with men, transgender people and people who inject drugs. Moving forward, robust data on these key populations is needed to evaluate how investments in the response to HIV impact these groups.

Building on previous analysis, our findings also offer novel insights on the potential for broader social and economic gains from investing in the HIV response that extend beyond the direct impact on new HIV infections.

- **Increasing investments towards the HIV response could: improve educational outcomes among children and adolescents and subsequently give rise to spill-over effects for current and future generations.** Reduced mortality rates among adults, resulting from higher levels of investment

in the HIV response, reduce the number of children orphaned by AIDS. For example, a reduction of approximately 722,000 orphans relative to BAU is estimated in Mozambique in 2030 when full funding targets for HIV are met. Combined with a reduction in new HIV infections in children and adolescents themselves, this leads to higher school enrolment rates and reduced school absenteeism. For instance, we estimate an additional 87,000 children enrolled in school in Mozambique in a single year. Similar trends are observed across other study countries.

- Increasing investments towards the HIV response could: contribute towards reducing gender inequalities in access to education.** We observe differential impacts by gender on educational outcomes associated with changes in funding levels for HIV, with greater gains observed among girls. In South Africa, for example, achieving full funding targets for HIV could increase the number of boys enrolled in secondary school in 2030 by 23,000 (or 0.8%), compared with an increase of 27,000 (or 0.9%) for girls of the same age. These findings are important to consider in the light of evidence that young girls are generally more likely to miss school and take on caregiving roles for family members living with HIV. Furthermore, girls were disproportionately impacted by school closures at the height of the covid-19 pandemic. By allowing more girls to stay in or return to school, the response to HIV could help to narrow the gender gap in education.
- Increasing investments towards the HIV response could: enable a shift in the demographic profile of countries, avoiding large losses to the working age population.** Under a fully funded HIV response scenario, a decline in mortality rates contributes to a larger population, compared with BAU funding levels. The most pronounced difference in population size between the scenarios is seen among the working-age population, particularly those aged 30-64. In Mozambique, for example, the size of this cohort could be an estimated 2.4% larger under a full funding scenario, in contrast to the total population that is 0.9% larger under this same scenario. These changing population dynamics associated with investing in the HIV response give rise to greater economic opportunities by enabling growth in the workforce.
- Increasing investments towards the HIV response could: contribute to wider and sustained economic gains in the long term, beyond the human lives saved.** The improved health and education outcomes from increased HIV investment contribute to human capital development. This, coupled with growth in the size of the working-age population, can drive economic growth. Our analysis finds that the GDP of South Africa—which has the highest burden of disease of the countries studied—could be 2.8% higher (equivalent to US\$17bn) than BAU funding levels in 2030 if HIV funding targets are met. Even countries with lower disease burdens see substantial gains if funding targets are met. Kenya, for example, could see its GDP rise by 1.1%, or US\$1.3bn. Overall, our findings suggest a sizeable return on investment from the response to HIV. For instance, in South Africa, estimates suggest that every dollar invested between 2022 and 2030 could result in GDP gains of US\$7.20. These findings suggest that increasing investment in the response to HIV is a key component of economic recovery, particularly within LMICs.

- **Increasing investments towards the HIV response could: contribute towards health systems strengthening and enhancing pandemic preparedness and response.** In addition to the economic gains estimated, the global response to HIV can serve multiple purposes in strengthening health systems and supporting preparedness for, and response to, future pandemics. Evidence of existing health system infrastructure developed for the response to HIV being re-deployed during the covid-19 pandemic in low- and middle-income countries sheds light on the contribution of the response to HIV to health system strengthening. Data from the Global Fund indicates that more than one-third of the budget allocated towards HIV, AIDS, TB and malaria, equivalent to a budget of more than \$2.5bn, has synergistically supported health security efforts. These findings offer further support for the need to ensure adequate investments in the response to HIV, not only to meet AIDS-related targets, but also to ultimately free up resources within health budgets to address other health priorities.
- **Increasing investments towards the HIV response could: result in substantial**

**overall health, social and economic gains. However, ensuring a sustainable response will require a range of strategies to enhance financing for the health sector more broadly and maximise the use of existing resources and partnerships.**

Introducing pro-health taxes to generate revenue for healthcare spending, earmarking allocations to health from government revenue and implementing measures to address tax evasion are some of the possible approaches to enhance overall financing for the HIV response and health more broadly. However, the adoption of policies aimed at enhancing financing alone is not enough to ensure a sustainable response to the HIV epidemic. Strategies aimed at maximising the use of existing resources and partnerships will also need to be considered. For instance, a closer integration of HIV and relevant health services holds the potential to enhance the accessibility and uptake of services while offering a more people-centred approach to care. Moreover, integrating HIV services and community-led responses into national health financing policies can also support the sustainability of the broader response to HIV.





As government budgets become increasingly constrained and the need to address immediate economic and fiscal priorities takes over, there is a risk that the HIV epidemic is relegated lower on political agendas. However, the findings from this study suggest that the long-term consequences of this course of action are far from trivial. By failing to meet the AIDS targets set in the Political Declaration, countries—particularly those with a high burden of disease—are at risk of higher death tolls from AIDS and related co-morbidities, increasing pressures on health systems, growing inequalities among vulnerable populations, and lost economic opportunities. Government budgets will continue to be burdened by the need to manage and treat the HIV epidemic, creating less fiscal space for other priorities that enable social development and economic growth.

The HIV epidemic is not an isolated issue and needs to be considered within the broader

context of the health and social agendas of governments. For instance, investment in the response to HIV can address inequalities in educational outcomes, as demonstrated by this study. Conversely, inequalities in access to education can give rise to vulnerability to HIV. Understanding these intricate linkages is important in creating broader political commitment across a wide and multi-sectoral range of stakeholders and providing the impetus to adequately finance the response to HIV. This will not only allow countries to achieve targets set to address the HIV epidemic, it will also contribute to achieving wider policy goals. Collectively, the findings presented in this report should act as a catalyst for policy decisions that ensure sufficient financing of the response to HIV—not only to meet the 2025 AIDS targets, but also to support broader policy priorities.

# Introduction

The number of new HIV infections is not slowing at a quick enough rate—the World Bank estimates that with continuation of current trends, the world is likely to fail to achieve a target to end the AIDS epidemic by 2030.<sup>a,1</sup> Improvements in prevention, treatment and testing had brought about large reductions in the incidence of HIV and deaths related to AIDS over the past two decades.<sup>b,2</sup> However, progress has since stalled. Targets set by the UN General Assembly in 2016 called for a 75% reduction in the global number of new HIV cases between 2010 and 2020, yet only a 32% decline was achieved.<sup>3</sup> With renewed, ambitious targets set for 2030 in the 2021 Political Declaration on HIV and AIDS, adopted by UN member states, there is increased urgency for action.<sup>4</sup>

Recent global crises—particularly the covid-19 pandemic—have further slowed progress in the response to HIV.<sup>5</sup> Global lockdowns restricting the movement of people to contain the spread of covid-19 created ripple effects across supply chains and the wider global economy.<sup>6</sup> This had knock-on implications for the response to HIV, constraining the supply of essential prevention

and treatment commodities (for example, condoms and drugs) and restricting access to HIV services.<sup>7</sup> The service disruption created for one epidemic—HIV—to mitigate the effects of another—covid-19—demonstrates the fragility of current health systems. Beyond the disruptions to HIV services, the covid-19 pandemic has also exacerbated existing social and economic inequalities, making already vulnerable groups less able to access HIV services.<sup>8</sup> As infectious disease epidemics are expected to become increasingly more common and severe, progress towards meeting the 2025 AIDS targets threatens to lag behind.<sup>9</sup> This creates a loud call to action to invest in HIV and other epidemics, and in building resilient health systems.

Moreover, these crises have redirected funding away from the response to HIV and pose a risk to health financing more broadly.<sup>10</sup> Many major international donors have reduced assistance for HIV.<sup>11</sup> At the same time, domestic fiscal purse strings have tightened as governments deal with rising debt levels in the aftermath of the covid-19 pandemic and the subsequent economic challenges.<sup>12</sup> As a result, domestic

<sup>a</sup> HIV (human immunodeficiency virus) is a virus that damages the cells in the immune system and weakens the ability to fight everyday infections and disease. HIV and AIDS: NHS [website]; 2023 (<https://www.nhs.uk/conditions/hiv-and-aids/>, accessed 13 February 2023).

<sup>b</sup> AIDS (acquired immune deficiency syndrome) is the name used to describe a number of potentially life-threatening infections and illnesses that happen when the immune system has been severely damaged by the HIV virus. HIV and AIDS: NHS [website]; 2023 (<https://www.nhs.uk/conditions/hiv-and-aids/>, accessed 13 February 2023).



investments in the HIV response have decreased by 2% annually over the past two years.<sup>13</sup> The World Bank estimates that in almost two-thirds (62%) of countries across the world, government health spending per capita will remain at or below pre-covid-19 (2019) spending levels by 2027.<sup>14</sup> As health financing becomes increasingly constrained, countries have reduced ability to adequately invest in the response to HIV.

Recognising the urgent need to get back on track in addressing the HIV epidemic, the 2021 Political Declaration set renewed funding targets to reach the goal of ending the AIDS epidemic as a public health threat by 2030, in line with Sustainable Development Goal 3 (target 3.3).<sup>15</sup> As part of the roadmap to meeting this aim, countries also adopted the Global 2025 AIDS Targets, a series of ambitious interim goals. However, without sustained political commitment, sufficient financing and appropriate policy approaches, these targets will become increasingly out of reach—funding levels in 2020 fell almost 30% below targets, making subsequent resource needs of US\$29bn annually by 2025 even harder to achieve.<sup>16</sup>

Meeting the targets set in the 2025 Political Declaration also has broader implications. If countries are unable to manage and control the spread of the HIV epidemic, it will continue to bear heavy costs on healthcare systems and strain existing health budgets. Furthermore,

failing to adequately finance the response to HIV is likely to result in impacts that extend far beyond health costs. The covid-19 pandemic exemplifies the intricate linkages between the spread of infectious disease and economic consequences—projections from the IMF suggest that the covid-19 pandemic will cost the global economy an estimated US\$13.8trn by 2024.<sup>17</sup> The HIV epidemic, in particular, is fuelled by inequalities driven by discrimination and stigmatisation, making the subsequent economic impacts even more concerning and heightening the risk of widening existing disparities.<sup>18</sup>

Policymakers now find themselves at a crossroads, with challenging decisions ahead on how to allocate a shrinking budget. A robust, evidence-informed case for increased and effective financing of the response to HIV is needed to demonstrate the gains—human, social and economic—and the implications of failing to do so.

This study seeks to answer a number of key questions:

- What is the human cost of failing to reach the Global 2025 AIDS Targets?
- How do these human costs influence broader social and economic outcomes?
- What is the role of HIV investment in health system strengthening for resilient pandemic recovery and future pandemic preparedness?

This study addresses these questions through bespoke economic analysis, an in-depth literature review and a series of expert interviews. The analysis compares health and socioeconomic outcomes under a 100% HIV response funding scenario—in which adequate financing to enable achieving the 2025 targets is mobilised—to a business-as-usual (BAU) scenario in which funding post-2021 is adjusted each year to maintain, but not expand, HIV service coverage levels. The findings demonstrate the magnitude of impact across 13 selected countries in Sub-Saharan Africa of failing to meet the AIDS targets due to funding shortfalls. The countries studied account for almost 50% of all new HIV infections globally in 2021.

A novel methodology has been adopted that extends estimates of the direct impacts of the AIDS epidemic on morbidity and mortality to capture the interaction of these health-related impacts with wider socioeconomic outcomes. It draws on the work of the World Bank's Human Capital Project, which highlights the role played by human capital development in economic development.<sup>19</sup> The economic outcomes of HIV/AIDS are modelled through a human capital impact pathway that estimates impacts through productivity gains for current and future

generations as a result of improved health and educational outcomes. The results highlight the substantial return on investment, not least in terms of lives saved, but also in terms of returns to societies and economies at large.

The remainder of this report is structured as follows:

- **A stall in progress:** We begin by discussing trends in the HIV epidemic over the past decade, the impact of the covid-19 pandemic and other recent global crises that have shaped the HIV response and financing environment, and the political commitments made by member states to reinvigorate the response to HIV.
- **The social and economic return on investment in the HIV response:** Next, we present results from our analysis to showcase the health, social and economic gains from enhancing financing for the HIV response to meet the 2025 AIDS targets.
- **The way forward:** We finally conclude by discussing potential policy options towards the response to HIV in the light of the current financing environment, drawing on the views of experts and case studies across different contexts.

# A stall in progress

## HIV epidemic trends in Sub-Saharan Africa

“We are threatened with extinction... It is a crisis of the first magnitude.”<sup>20</sup> In his 2001 address to the UN General Assembly, the then-President of Botswana, Festus Mogae, left his audience in no doubt about the severe risks of neglecting the HIV epidemic in Sub-Saharan Africa. Mr Mogae’s speech followed decades of near-uncontrolled spread of HIV across the region, with the number of people living with HIV nearly tripling, to 17.8m, between the early 1990s and 2000.<sup>21</sup> This spread was fuelled by pervasive misinformation surrounding the virus—itsself a product of woefully underfunded education and prevention campaigns.<sup>22</sup>

Mr Mogae’s warning was not ignored. The new millennium marked a rapid increase in the financing that the international community was willing to dedicate to tackle the HIV epidemic. New vessels for funding emerged, including The Global Fund to Fight Aids, Tuberculosis and Malaria (The Global Fund; established in 2001) and the US President’s Emergency Plan for AIDS Relief (PEPFAR; established in 2003). Funding for the HIV response in developing countries—from national, international and private sources—swelled to nearly US\$10bn in 2005, up from just US\$5bn four years earlier.<sup>23</sup>

Several factors contributed to this surge in financing, including new political commitments, advancements in data and science, and the integration of HIV within social and human rights movements. Following the UN Security Council meeting in 2000 and the UN General Assembly in 2001, which confirmed HIV and AIDS as a political issue requiring global action, a conducive environment for HIV response financing emerged.<sup>24</sup> Significant progress was also made in research, enabling a deeper scientific understanding of the epidemic and its transmission—one study found that the number of annual research publications on HIV and AIDS rose from 818 in 2000 to 2,450 in 2016.<sup>25</sup> Moreover, the incorporation and acceptance of HIV and AIDS as a human rights issue has enabled strong community-led advocacy efforts, pushing the dialogue further.

The surge in deployment of resources towards the HIV response in the early 2000s allowed health systems to implement measures to prevent and treat the virus. Dissemination of public health campaigns instigated fundamental behaviour changes—such as increased condom use—that reduced viral transmission.<sup>26</sup> The expansion of harm reduction education and access to HIV prevention and healthcare services was also particularly important for key populations most at risk of HIV infection, such



as sex workers, men who have sex with men and injecting drug users, given the substantial social and structural barriers they face in accessing healthcare.<sup>27,28,29</sup>

In addition to influencing behaviour changes, the mobilisation of financing in the rollout of antiretroviral therapy (ART) also radically improved the health and wellbeing of HIV-positive individuals, and resulted in wider spill-over effects.<sup>c</sup> When combined with HIV testing campaigns, ART has proved invaluable in dampening transmission rates, including between pregnant women and their children.<sup>30</sup> The availability of ART has also created benefits for those not directly impacted by the HIV epidemic. For example, a study from South Africa found that increased ART availability for people living with HIV helped to draw new people into the healthcare system—findings showed that the number of people being tested for tuberculosis (TB) was 3.7% higher in facilities where ART had been made available for at least nine months.<sup>31</sup> Another study in Malawi found that increased availability of ART contributed to increased spending on education and increased schooling among children, including among HIV-negative

individuals.<sup>32</sup> Another study evaluating changes in employment outcomes as a function of access to ART treatment between 2000 and 2011 demonstrated an increase in employment rates among people living within 5km of ART clinics.<sup>33</sup>

Sub-Saharan Africa's battle against the HIV epidemic bore impressive results. Incidence of HIV in the region fell by almost 50% between 2010 and 2020, while AIDS-related deaths decreased by 47% over the same period.<sup>34,35</sup> These successes underpinned broader global trends in reducing HIV incidence, which were felt across developing and developed nations alike—from Ukraine to Switzerland.<sup>36</sup>

However, despite progress observed over the past decade, more recent estimates indicate that the number of new HIV infections globally dropped by a mere 3.6% between 2020 and 2021, representing the smallest annual decline since 2016.<sup>37</sup> The pace of rollout of ART has also slackened—the number of people receiving HIV treatment grew more slowly over the course of 2021 than it had in over the past ten years.<sup>38</sup> Furthermore, UNAIDS estimates that only 52% of children aged 0-14 living with HIV received

<sup>c</sup> ART (antiretroviral therapy) refers to the use of a combination of three or more antiretroviral drugs for treating HIV infection. ART involves lifelong treatment. Synonyms are combination ART and highly active ART. (<https://www.who.int/publications/i/item/9789241549684>, accessed 13 February 2023).

ART in 2021, shedding light on the lag in progress specifically in relation to paediatric care and treatment.<sup>39</sup> The implications of the slowdown in progress extend beyond direct impacts on new HIV infections and AIDS-related deaths, threatening to deepen inequalities across vulnerable populations who are most impacted by and at risk of HIV.<sup>40</sup>

The 2030 deadline is rapidly approaching, but hopes of meeting the 2021 Political Declaration's vital objectives have receded. As progress appears to falter, Mr Mogae's warning of the risks of neglecting the HIV epidemic is just as relevant as it was two decades ago.

### **The impact of concurrent crises on the response to HIV**

Numerous global shocks have coalesced to stall Sub-Saharan Africa's progress in tackling HIV, not least the covid-19 pandemic. Lockdowns implemented to limit the spread of covid-19 severely disrupted the manufacture and transport of goods, resulting in a breakdown of global supply chains. As a result, the supply of essential commodities for HIV prevention and treatment—such as condoms, lubricants, HIV tests and ART drugs—became severely restricted.<sup>41</sup> For instance, a weeklong shutdown of the factories of Karex, the world's largest manufacturer of condoms, during the Malaysian lockdown in 2020 led to a shortfall of 100m condoms.<sup>42</sup> In a study from the UK, around 6.9% of women and 16.2% of men aged 18-44 years reported unmet need for condoms in 2021.<sup>43</sup>

The impact of covid-19 on the response to HIV was not limited to supply-chain disruption. Restrictions on the movement of people resulted in significant declines in uptake of HIV testing and prevention services. Specifically, the number of people accessing HIV prevention programmes

globally dropped by 11%, while HIV testing plummeted by 22%.<sup>44</sup> The impacts were even more pronounced in Sub-Saharan Africa, the region with the highest burden of disease and therefore the greatest need for testing. For instance, the use of testing services declined by 30% in Uganda and by almost 50% in South Africa.<sup>45,46</sup> This dramatic decline in testing not only prevented people from accessing lifesaving treatment for HIV, it also had implications for the spread of the virus between people unaware of their HIV status.<sup>47</sup>

The covid-19 pandemic has also served to widen inequalities across different demographic groups, reversing some of the previous progress made in the response to the HIV epidemic. International efforts to eliminate poverty—a factor that can increase vulnerability to HIV and AIDS by reducing access to services—have regressed as a function of covid-19.<sup>48</sup> This has been driven by escalating ill health, unemployment and the macroeconomic crisis.<sup>49</sup> The World Bank estimates that 97m people globally may have been forced into extreme poverty as a result of the covid-19 pandemic, which has contributed to a loss of three to four years of progress in ending extreme poverty.<sup>50</sup> While the number of people in poverty has increased globally, this trend has been particularly pronounced in Sub-Saharan Africa.<sup>51</sup> Poverty increases the likelihood of HIV risk behaviours—for example transactional sex and substance abuse—and limits access to healthcare, therefore creating increased vulnerability to HIV infection.<sup>52</sup>

Similarly, the covid-19 pandemic has disproportionately impacted access to HIV and AIDS services among vulnerable and marginalised populations, including adolescent girls and young women, thus widening existing inequalities.<sup>53</sup> Beyond impacts on access to



**“We can lose whole decades of the fight to reduce global health inequalities because we are not keeping up investment levels in tackling HIV.”**

Kalipso Chalkidou, head of health finance, The Global Fund to Fight AIDS, Tuberculosis and Malaria; visiting professor, Imperial College London

services among vulnerable populations, the covid-19 pandemic has also had implications on access to education. For instance, the World Bank estimates that 10m girls were at risk of dropping out of school following school closures during the covid-19 pandemic.<sup>54</sup> This in turn increases HIV vulnerability among an already vulnerable population, with research from countries in Africa with high HIV prevalence rates indicating that keeping girls in secondary school reduces their risk of HIV infection by around 50%.<sup>55</sup>

Beyond the covid-19 pandemic, a number of humanitarian crises have set back progress in tackling the HIV epidemic in Sub-Saharan Africa. For instance, Ethiopia’s civil war has interrupted access to HIV prevention and treatment in areas affected by the conflict.<sup>56</sup> Furthermore, the climate crisis may have also begun to exacerbate the spread of HIV. This is particularly pertinent in Sub-Saharan Africa, which is vulnerable to the impacts of climate change given the increasing frequency of severe droughts.<sup>57</sup> Drought heightens HIV transmission risk among vulnerable women in poor countries.<sup>58</sup> This relationship is understood to be a product of elevated food insecurity, which is associated with higher rates of transactional sex and HIV contraction.<sup>59</sup>

### **Renewed international commitments**

There is a new ray of hope in addressing the HIV epidemic amid the challenges posed by global shocks such as the covid-19 pandemic. UN member countries adopted a new Political Declaration on HIV and AIDS (replacing a 2016 declaration) at the High-Level Meeting on AIDS held between June 8th and 10th 2021.<sup>60</sup> Within this, member states affirmed commitments to reach the goal of ending AIDS as a public



health threat by 2030, in line with Sustainable Development Goal 3 (target 3.3).<sup>61</sup> Targets were set to reduce the number of annual new HIV infections to under 370,000 and annual AIDS-related deaths to under 250,000 by 2025. Furthermore, world leaders committed to reinforcing global, regional, national and subnational responses to the HIV epidemic through enhanced engagement with a broad range of stakeholders—including regional and subregional organisations and people living with, at risk of and affected by HIV and AIDS.<sup>62</sup>

The declaration also incorporates a critical component of the HIV epidemic: the differential impact among vulnerable groups and key populations. Currently, high levels of HIV infection among adolescents is a major concern in Sub-Saharan Africa, which accounts for 80% of new infections among adolescents globally.<sup>63,64</sup> Young women and girls carry the heaviest burden of HIV in the region—in 2021 adolescent girls and young women aged 15-24 accounted for 63% of new infections in Sub-Saharan Africa.<sup>65</sup> In the light of this, a commitment was made to reduce the number of new infections among adolescent girls and young women to below 50,000 by 2025.<sup>66</sup>

In addition, UN member states have set the 95-95-95 targets on testing, treatment and viral suppression across all demographic groups and geographies.<sup>67</sup> The targets are that 95% of those living with HIV know their status, 95% of those who know their HIV-positive status are accessing treatment and 95% of those on treatment have suppressed viral loads.<sup>68</sup> The crucial question is how much progress has been made since the targets were set. According to UNAIDS, around 88% of people living with HIV in Sub-Saharan Africa knew their status in 2021, while 78.5% were receiving ART and only 71.5% had suppressed viral loads.<sup>69</sup> These findings

indicate that coordinated action and political commitment from UN member states will be needed to achieve key targets for Sub-Saharan Africa set within the 2021 Political Declaration. It is estimated that annual HIV response investments of US\$29bn will be needed in low- and middle-income countries by 2025 to meet these targets, necessitating the mobilisation of finance from multiple sources.<sup>70</sup>

## The current financing environment

Ensuring adequate and sustainable financing streams and modalities will be vital to reinvigorate progress against HIV in Sub-Saharan Africa and to meet the targets set in the 2021 Political Declaration. Unfortunately, the current global economic environment is bleak. Economic recession, growing inflationary pressure and rising debt levels have created competing pressures on government budgets, diverting funds away from the response to HIV and other ongoing epidemics, and the health sector more broadly.<sup>71</sup>

It has been estimated that low- and middle-income countries (LMICs) will need US\$29.3bn annually by 2025 to achieve the Global 2025 AIDS Targets.<sup>72</sup> However, an annual shortfall of at least US \$8bn in funding is estimated in 2025 based on current resource availability.<sup>73</sup> The renewed targets are welcome and required but, given the tightened fiscal budgets, a widening financing gap for the HIV response has created an urgent call to action.

Global economic conditions, including those resulting from the covid-19 pandemic, have led to the redeployment of finances to address immediate economic and health priorities. As a result, financing for the HIV response has suffered a double hit, with declines in both international and domestic investments. Many major international donors have reduced

**“Over the next four to five years there will be less room to grow government spending and, within that, health spending and, within that, health spending on HIV.”**

Kalipso Chalkidou, head of health finance, The Global Fund to Fight AIDS, Tuberculosis and Malaria; visiting professor, Imperial College London

assistance—in fact, international resources targeted towards tackling the HIV epidemic were 6% lower in 2021 than they were in 2010.<sup>74</sup> This is partly explained by a decline in bilateral donor funding—official development assistance for HIV from bilateral donors (other than the US) have fallen by almost 60% over the past decade.<sup>75</sup>

At the same time, domestic finances have suffered, particularly in LMICs, following the covid-19 pandemic, which stifled economic activity and growth.<sup>76</sup> Economies have further deteriorated as a result of Russia’s invasion of Ukraine, which elicited inflationary pressure from a surge in the prices of essential commodities, suppressing global consumption. This has led to the IMF downgrading its growth projections for numerous countries in Sub-Saharan Africa.<sup>77</sup> In fact, the World Bank has predicted that 41 countries—including Liberia, Mozambique and Sudan—are likely to see government expenditures (in real terms) remain below pre-pandemic levels until 2027, reflecting a ‘lost’ decade for public investments.<sup>78</sup>

Budgets in Sub-Saharan Africa are also threatened by the significant debt that governments took on to tackle covid-19, compounding a pre-pandemic trend of high government borrowing.<sup>79,80</sup> In order to finance their covid-19 pandemic responses, Sub-Saharan African governments borrowed 4.5% more than predicted had the pandemic not occurred.<sup>81</sup> In

fact, the base for financing of health and HIV had already started to weaken across the region prior to the pandemic. Debt obligations across countries rose from 32.7% of GDP in 2014 to 51.5% by 2019, while revenues simultaneously declined marginally over the same period, from 21.2% to 20.9%.<sup>82,83</sup> The multiple and concurrent crises over recent years have served to shrink fiscal capacity within an already vulnerable environment.

Crucially, high inflation rates may exacerbate the magnitude of interest payments on this debt, imposing an additional burden on government budgets.<sup>84</sup> The World Bank predicts that interest payments on debt are projected to constitute roughly 10% of government spending in Mozambique in 2027 and 18% in Zambia.<sup>85</sup> Servicing this debt risks compromising long-term growth and prosperity across the region as a result of cuts to essential infrastructure and services.<sup>86</sup>

A tragic corollary of constrained budgets and burdensome debt repayments will be restricted expenditure on health—including domestic investments towards the HIV response. Furthermore, even in countries not burdened by debt where the World Bank predicts an increase in per capita government spending, increased demand for health and social services is still likely to constrain the ability to invest specifically in HIV.<sup>87</sup> Domestic financing for HIV in LMICs has

already fallen over the past two years, with a decline of 2% in 2021.<sup>88</sup>

Reversing the shortfall in financing will be critical not only to meeting the AIDS targets set out in the 2021 Political Declaration, but also to supporting broader health system functions, including pandemic preparedness and response (see Box 1 below for more detail). Achieving this will necessitate ambitious investments from national and international governments, as well as the donor community. Investments made to respond to the HIV epidemic could ultimately

free up resources within health budgets to address other health priorities.

In the next section of this report, we explore how the implications of missing the 2025 AIDS targets due to inadequate financing of the HIV response go far beyond the direct impacts on individuals, permeating societies and economies. The findings show that the rewards of meeting the targets—spanning public health, society and the economy, as well as broader health systems—will vastly outweigh the short-term financial costs.



**“In a nutshell, investments in HIV contribute to system strengthening because they immensely expand the health capacities of a country where they occur.”**

Markus Haacker, non-residential fellow, Center for Global Development; fellow, Centre for Global Health Economics, University College London

**BOX 1****Building resilient health systems through the response to HIV**

The covid-19 pandemic has shed light on the need for investments in pandemic preparedness and the strengthening of health systems. Political leadership globally is more aware than ever, as are healthcare providers and the public at large. But where does the HIV epidemic fit in? Let's circle back and reflect on the role of the response to HIV in building resilient health systems. Investments in the global response to the HIV epidemic have served multiple purposes in supporting preparedness for, and response to, potential future pandemics: (i) by strengthening infrastructure to support the prevention, detection and response to pandemics; (ii) by expanding essential healthcare resource availability and skills; and (iii) by enabling more equitable access to pandemic countermeasures.

**Strengthening infrastructure to support prevention, detection and response to pandemics**

Significant infrastructural investments in the global response to the HIV epidemic have played an important role in enhancing pandemic preparedness and response (PPR) in countries. Improvements in the infrastructure of healthcare systems through investments in the HIV response hold the potential to support the prevention, detection and response to health outbreaks. This was illustrated during the covid-19 pandemic, where pre-existing health system infrastructure developed for the response to HIV was re-deployed, particularly in low- and middle-income countries (LMICs). A recent report by the Global Fund to Fight AIDS, Tuberculosis and Malaria showed that most LMICs relied on existing laboratories aimed at tackling HIV, AIDS, TB and malaria to respond to the covid-19 crisis.<sup>89</sup> For example, this existing infrastructure supported the scale-up of diagnostic testing for covid-19 within LMICs.<sup>90</sup> The United States President's Emergency Plan for AIDS Relief (PEPFAR) has also noted the strategic utility of laboratory capacities through investments in the HIV response, which have helped countries respond to the covid-19 pandemic.<sup>91</sup>

HIV investments have also played an important role in strengthening infrastructure for public health surveillance and information systems.<sup>92</sup> These surveillance systems, developed through HIV-focused investments, were deployed to support national efforts to monitor and respond to the covid-19 pandemic across various countries.<sup>93</sup> This demonstrates how existing surveillance and information systems funded through the response to HIV can be leveraged to serve broader health system needs.

**Expanding essential healthcare resource availability and skills**

Investments in the response to HIV also played an important role in supporting LMICs with weak healthcare systems to cope with the additional resource needs brought on by the covid-19 pandemic and to deliver critical health services. For example, funding from PEPFAR has supported the training of more than 325,000 health workers across Africa to provide essential health services to communities.<sup>94</sup> This allowed countries to respond to the dual threats of HIV and covid-19, providing healthcare workers with the ability to adapt to the rapidly changing environment during the pandemic. The use of existing healthcare tools also enabled health systems to adjust and monitor staffing needs to ensure that the delivery of priority HIV and AIDS services remained uninterrupted.<sup>95</sup>



### Enabling more equitable access to pandemic countermeasures

Beyond providing the physical and resource-management infrastructure to support pandemic preparedness and response, financing of the response to HIV has also enhanced access to health services and treatment more broadly, particularly among hard-to-reach, vulnerable populations. HIV programmes have long played an important role in identifying, engaging and educating vulnerable populations, and providing access to services such as testing.<sup>96</sup> In response to covid-19, community healthcare workers funded by PEPFAR supported communities with the pandemic response. For example, in Ethiopia community cadres drew on strong relationships and networks built through the response to HIV to engage with communities during the covid-19 pandemic. Specifically, they provided training sessions on covid-19 risk factors, signs and symptoms to the communities that they serve.<sup>97</sup>

Alongside these efforts, community-led organisations involved in the distribution of HIV resources also supported the pandemic response. Specifically, they played a crucial role in conducting outreach within communities, particularly among vulnerable populations, enhancing the public's awareness of covid-19.<sup>98</sup> In this sense, investments in the response to HIV that have facilitated the development of people-centred systems were successfully leveraged to support equitable access to pandemic counter-measures within communities. Speaking of South Africa's experience, Keith Jefferis, senior policy advisor in Botswana's Ministry of Finance noted: "The prior experience of dealing with HIV and AIDS was important not just in terms of health infrastructure, but also the relationship between the population and the health system."

Overall, enhancing investment directed towards the response to HIV plays a key role in strengthening health systems and supporting global health security. Data from the Global Fund indicates that more than one-third of the budget allocated towards HIV, AIDS, TB and malaria has synergistically supported health security efforts. This represents a budget of more than US\$2.5bn for activities that support health security in a number of African countries, including Kenya, Nigeria and Uganda since 2014, funded by the response to HIV.<sup>99</sup>



**“The prior experience of dealing with HIV and AIDS was important not just in terms of health infrastructure, but also the relationship between the population and the health system.”**

Keith Jefferis, senior policy advisor, Ministry of Finance, Government of Botswana

# The social and economic return on HIV investment

## Quantifying the potential

Countries in Sub-Saharan Africa now find themselves in a challenging situation. On the one hand, they face a highly constrained fiscal environment with rising debt obligations, a dwindling health budget and various competing priorities. On the other hand, the HIV epidemic still needs to be urgently addressed, particularly in the light of the recent setbacks, in order to meet ambitious targets. Quantifying the potential gains that could be made by making adequate investments in the response to HIV will be a key consideration in determining where scarce resources are allocated in these countries.

Economist Impact set out to quantify the impacts of alternative HIV response financing scenarios for meeting the 2025 targets.<sup>100</sup> We adopted a novel methodology that extends estimates of the direct health impacts of the HIV epidemic on morbidity and mortality provided by Avenir Health, to

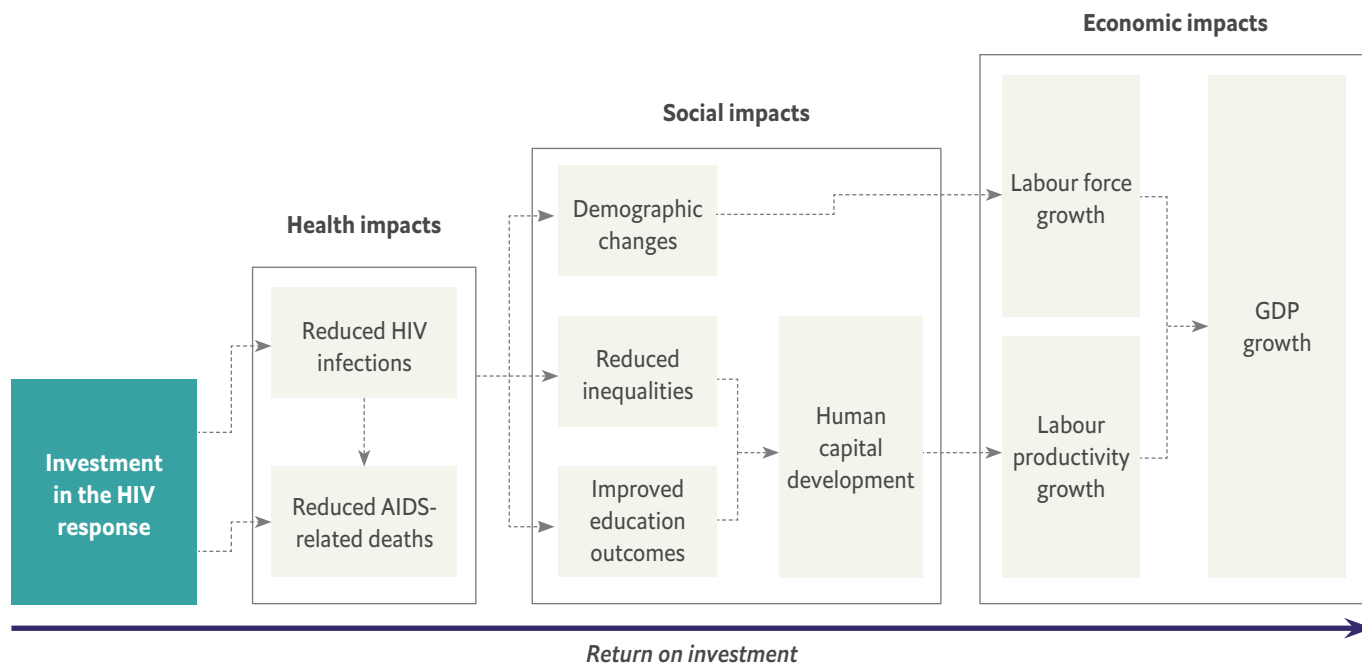
capture the interaction of these impacts with wider socioeconomic outcomes.<sup>d</sup> These outcomes are modelled through a human capital impact pathway (see Figure 1 below), assessing the productivity gains for current and future generations as a result of improved health and educational outcomes. The approach is in line with the World Bank's Human Capital Index, which highlights the role played by human capital development in economic development, and the potential losses from lack of sufficient investment.<sup>101</sup>

The assessment uses a bottom-up, custom-built scenario model to estimate the expected gains associated with securing adequate financing to achieve the 2025 AIDS targets noted in the 2021 Political Declaration (100% funding scenario), relative to a scenario in which funding post-2021 is adjusted each year to maintain, but not expand, HIV service coverage levels following the covid-19 pandemic (BAU scenario). This chapter presents a comparison of a range of health, demographic, social and economic outcomes under these scenarios across 13 selected countries in Sub-Saharan Africa with a high burden of disease. The full set of results and estimated impacts across each country is presented in Appendix I of this report, with country profiles included in Appendix II. Further detail on the countries and scenarios modelled and the methodology for the analysis is provided in Appendix III.



<sup>d</sup> The Avenir Health methodology and findings were validated by a multi-sectorial group as part of the Global AIDS Target Setting, supported by UNAIDS and Avenir.

Figure 1: Model framework: From investments in HIV to socio-economic impact



Graphic insight: Economist Impact

### Reducing HIV infections: the direct benefit of funding

The most direct impact of increased funding towards the response to HIV is a reduction in the number of new infections—findings that have informed the 2025 AIDS targets that have been set. Compared with a BAU scenario, estimates provided by Avenir Health show a projected reduction in the number of new HIV infections in 2030 when 100% of the HIV funding targets are met.<sup>e</sup> These findings are consistent across all study countries, which are estimated to observe a decline of anywhere between 40% to 90% in new HIV infections in 2030.

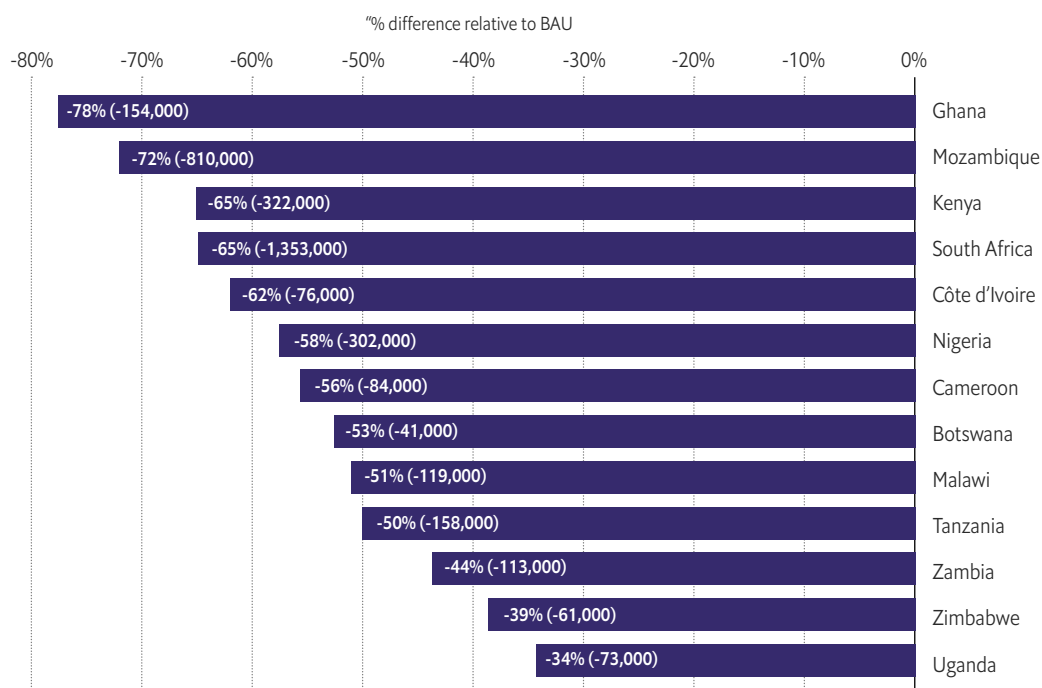
The estimates from Avenir Health indicate that the impacts of a fully-funded response to HIV in reducing new HIV infections are most pronounced in high-burden countries. For example, in South Africa, an estimated 0.4% of the population, or four in every thousand, becomes newly infected

with HIV each year, the highest across all countries studied.<sup>102</sup> If additional funding to meet the 100% targets is secured, 1.35m new HIV cases respectively could be averted in South Africa between 2022 and 2030 (see Figure 2). This is equivalent to a 65% reduction in the number of new HIV infections in South Africa. Similarly, Mozambique could see a reduction of over 70%. Mozambique also has one of the highest global incidence rates of malaria-HIV and TB-HIV co-infection, highlighting potential spill-over effects from this reduction in HIV infections.<sup>103</sup>

In addition to the differential burden of disease across countries, the adequacy of current funding levels also determines how much of the burden could be averted under BAU. For example, Ghana has a lower disease burden than Mozambique and South Africa, with an estimated 0.06% of the population becoming newly infected with HIV each year.<sup>104</sup> Despite this, Ghana would be expected to see the largest

<sup>e</sup> Our findings on the impacts of alternative funding scenarios on HIV infection rates draw on estimates provided by Avenir Health. Please refer to Appendix II for further detail.

**Figure 2: Difference in the total number of new HIV infections under a 100% funding scenario, compared to BAU (cumulative 2022 - 2030), % difference (absolute difference)**



Source: Avenir Health; Economist Impact analysis

impact of meeting the 100% funding targets, with an estimated 154,000 new infections averted between 2022 and 2030. Compared with South Africa, where BAU funding levels comprise 65% of the total HIV funding targets, in Ghana they make up only 50% of the targets. Our findings suggest that Uganda would see the smallest impact if HIV funding targets were met relative to BAU, with a 34% decline in the number of new HIV infections by 2030. It is likely that this finding is driven by a combination of the relatively lower HIV incidence in Uganda (1.30 new infections per 1,000 population<sup>105</sup>) and the fact that more than 75% of the HIV funding requirements are already being met. Countries that are furthest away from meeting their HIV funding targets therefore have the most to lose from maintaining BAU funding levels (i.e., not fully closing the funding gap).

## Shining a light on girls, women and children

Evidence shows that young girls and women are at a higher risk of contracting HIV.<sup>106</sup> This leaves them more vulnerable, but also means that they could potentially stand to gain the most from increased investment in the response to HIV. Not only does this give rise to opportunities to address channels of gender disparity, the subsequent impacts on future generations would also be substantial and should be accounted for when considering the value of such investments.

Our analysis builds on the work conducted by Avenir Health which estimates the direct impacts on HIV infections from securing adequate financing to enable achieving the 2025 targets. The findings demonstrate that closing the funding gap would not only disproportionately reduce the number of new HIV infections among girls and



women, reduce maternal and child mortality and decrease the number of orphaned children, but also subsequently improve educational outcomes.

**A disproportionate impact on girls and women**

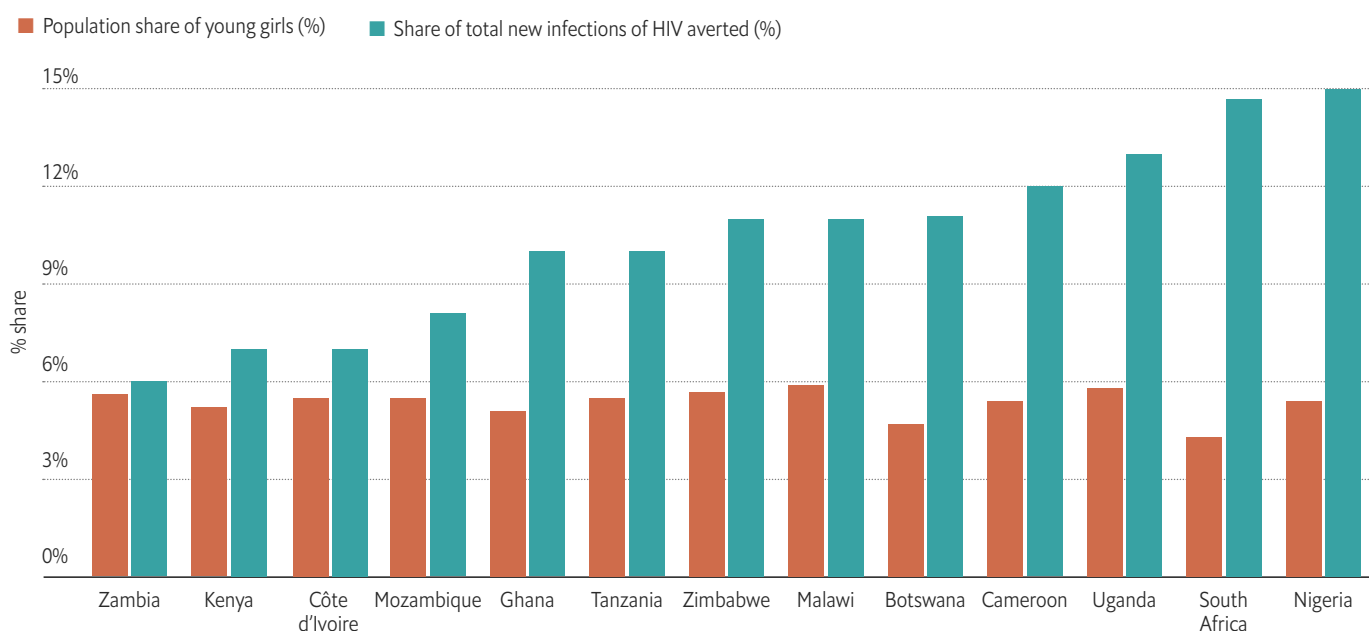
In a BAU scenario, a greater proportion of young girls and women contract HIV each year, relative to the general population. In South Africa, for example, whereas the 2022 baseline HIV incidence in our analysis is 0.3% across the general population, this increases to 0.4% for the total female population, and to 1.2% for adolescent girls aged 15-19. In other words, at least one in every 100 girls within this age bracket will become infected with HIV if funding levels remain on the same course. Similar differentials between women and girls and the rest of the population are observed across other countries studied.

Stigma and gender discrimination impact on the ability of young girls and women to seek health services and make informed decisions to protect their health, including those that help to prevent them contracting HIV.<sup>107</sup> Furthermore, gender-

based violence against young girls and women can also deter them from negotiating safer sex, placing them at higher risk of exposure to HIV.<sup>108</sup> Therefore, special attention is needed to monitor how investments in the response to HIV could be used to ensure that services are available and accessible to this vulnerable group.

Our study finds a significant drop in new HIV cases among adolescent girls and young women across all study countries when 100% of funding targets are met. More strikingly, the gains in terms of reduced cases for this cohort are disproportionate relative to its size in the population across all countries studied. To illustrate, the female population aged 15-19 in both South Africa and Nigeria could account for around 15% of the total reduction in new HIV infections if the HIV funding targets are met, despite making up roughly only 5% of the total population in each country (see Figure 3). These findings demonstrate how meeting the funding targets could have a particularly pronounced impact among this vulnerable group and contribute towards addressing existing inequalities.

**Figure 3. Reduced incidence of HIV in young girls (aged 15-19) relative to total reduction (cumulative 2022-30), compared with their share within the total population**



Source: Avenir Health; Economist Impact analysis

### Maternal mortality and orphanhood

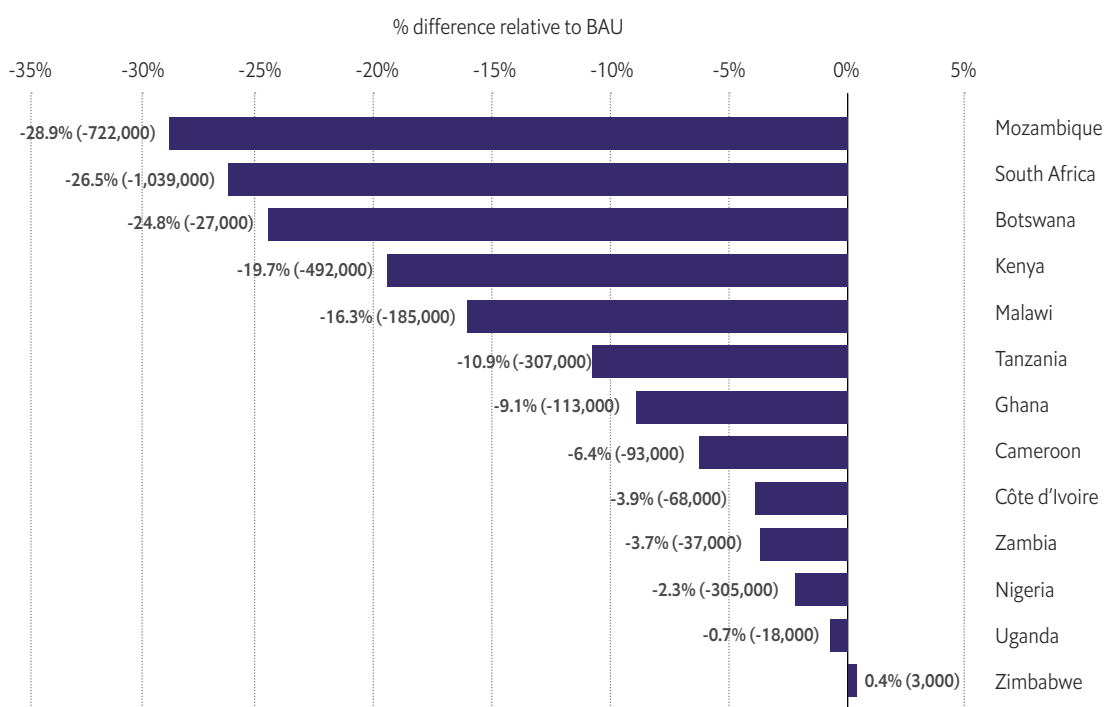
The reduction in HIV incidence among young women and girls is striking in and of itself in highlighting the potential equity gains that could be realised from increased HIV funding among this vulnerable group. Young women and girls are also important to consider in the light of evidence demonstrating the direct impact of HIV infections on maternal health outcomes.

HIV-positive pregnant and postpartum women are found to have an eight times higher risk of death, compared with HIV-negative pregnant women.<sup>109</sup> These impacts are particularly concentrated in Sub-Saharan Africa, which alone accounts for around two-thirds of global maternal mortality, a high proportion of which is attributable to AIDS.<sup>110</sup> Roughly one in four deaths in pregnant or postpartum women in

Sub-Saharan Africa is attributable to AIDS.<sup>111</sup> A recent study on the impact of the US President’s Emergency Plan for AIDS Relief (PEPFAR) found that countries funded by the scheme witnessed substantial reductions in maternal and child mortality, of 25% and 35% respectively, compared to countries without PEPFAR funding. Although our model does not directly quantify these effects, an increase in HIV as a risk factor for perinatal maternal mortality could place a substantial burden on this vulnerable population.

Reduced maternal infections and mortality from enhanced financing for HIV can also give rise to positive social outcomes by reducing orphanhood—in Sub-Saharan Africa, 28% of all children orphaned between 2001 and 2021 were orphaned as a result of AIDS-related parental death.<sup>112</sup> We find that the number of children

**Figure 4: Difference in the number of orphaned children and adolescents (aged 0-17) under the 100% funding scenario compared to BAU (2030), % difference (absolute difference)**



Source: Avenir Health; Economist Impact analysis

being orphaned by AIDS can be substantially curbed by enhancing investments in HIV, with reductions of between 1% and 29% seen across all study countries when HIV funding targets are met. Mozambique is expected to see the most significant gains, with a 29% reduction in the number of orphans in 2030 (equivalent to 722,000 fewer orphans). Cumulatively between 2022 and 2030, our analysis estimates 3.5m fewer orphans in Mozambique.

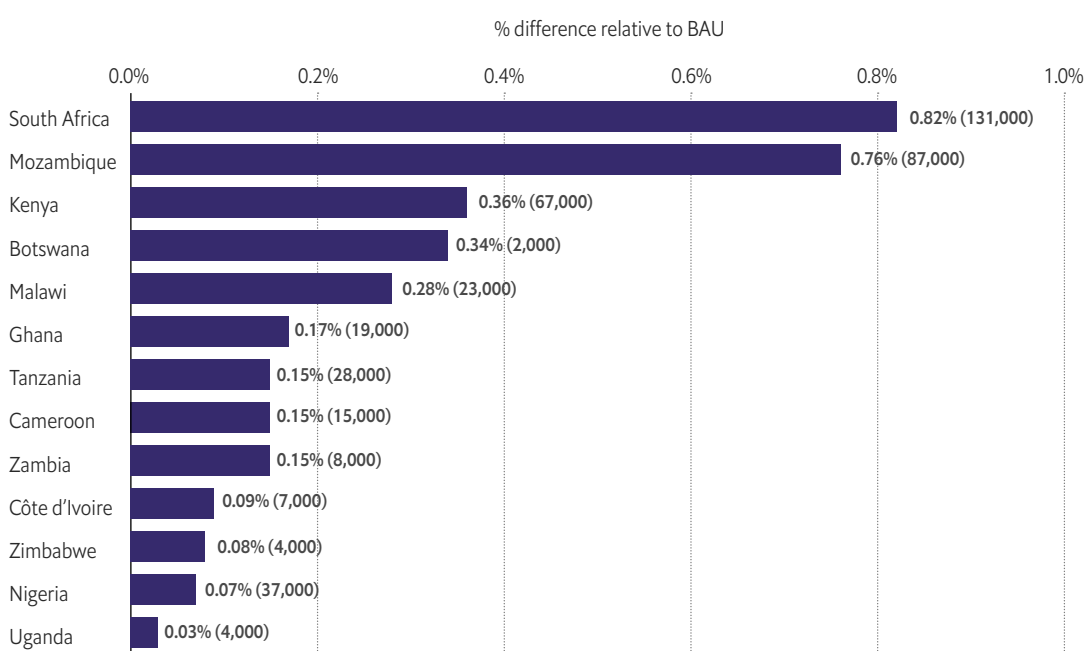
Other countries see similar trends, albeit of a lower magnitude. For example, the number of orphans is expected to be reduced by 26% in South Africa in 2030, and by 25% in Botswana, when 100% of the HIV funding targets are met (see Figure 4). Zimbabwe is the only country in our sample that would be expected to see a (small) increase in the number of orphans in a 100% funding scenario, which could be driven by changes in the demographic structure of the

country. Specifically, Zimbabwe is projected to have a higher proportion of children aged 0-4 within its population when 100% of the funding targets are met, relative to other countries. As a result, in absolute terms, the number of orphans increases marginally.

### Educating a new generation

The impact of reduced maternal mortality on the number of orphans also gives rise to positive educational outcomes for children. Children orphaned by AIDS have been found to have lower levels of motivation and poorer attitudes towards learning.<sup>113</sup> More broadly, orphaned children are less likely to be enrolled in school than children with one or both parents alive—a study of 40 countries in Sub-Saharan Africa reveals that orphans are 13% less likely to be enrolled in school, a statistic that we used to inform our analysis.<sup>114</sup>

**Figure 5: Difference in school enrollment across all levels of education under the 100% funding scenario compared to BAU (2030), % difference (absolute difference)**



Source: Economist Impact analysis

Beyond impacts through orphanhood, HIV incidence across the population also impacts on school enrolment and attendance. Reductions in HIV incidence from increased funding—particularly among young girls and women—can create additional educational benefits. For example, research from South Africa shows that HIV-positive children are 69% more likely to miss school days.<sup>115</sup> Children of HIV-positive adults may also spend more time caring for their sick parents and face financial difficulties that impede their schooling.<sup>116</sup>

Our analysis—accounting for the impacts of reduced new HIV infections among both children and adults, and fewer children becoming orphaned—estimates that increasing HIV funding to meet the targets could contribute to increased school enrolment and attendance across all levels of education. For example, in both South Africa and Mozambique the number of children enrolled in school could increase by roughly 0.8% in 2030 under a 100% funding scenario relative to a BAU scenario. This translates to an additional 131,000 and 87,000 children in school in each country respectively (see Figure 5). At a slightly lower but still substantial order of magnitude, we estimate that Kenya and Botswana would respectively see a 0.36% (67,000 children) and 0.34% (2,000 children) increase in school-enrolled children under the 100% funding scenario, compared to BAU.

In addition to increases in total school enrolment across all countries studied, we also observe

differential impacts by gender. For example, achieving full funding levels for HIV in South Africa could increase the number of children enrolled in secondary school in 2030 by 50,000—23,000 are expected to be boys (a 0.8% increase) and 27,000 girls (a 0.9% increase). These findings are driven by the differential burden of HIV on young girls, as discussed above.

These findings demonstrate the potential of HIV investments to narrow the gap in educational access between girls and boys. For example, girls are generally more likely to miss school and take on caregiving roles for family members living with HIV.<sup>117</sup> The covid-19 pandemic has also served to reverse some of the progress made in addressing these gender disparities. The Human Capital Index metric of learning-adjusted years of schooling found that school closures due to covid-19 led to a loss of around 0.6 school years per student.<sup>118</sup> School closures are likely to result in loss of learning and increase the likelihood of school dropout, particularly for certain cohorts of the population, including young girls. A joint study from UNESCO, UNICEF and the World Bank estimates that nearly 10m additional girls globally are at an increased risk of dropping out of school in the next decade owing to the covid-19 pandemic.<sup>119</sup> By enabling more girls to enroll in school, as shown in the results above, increased HIV funding could therefore contribute to addressing gender disparities and improving educational outcomes among young girls, a particularly vulnerable population.

**BOX 2****Leaving no one behind: addressing key populations through the response to HIV**

Key populations—including sex workers, gay men and other men who have sex with men (MSM), transgender people and people who inject drugs—have been disproportionately impacted by the HIV epidemic. For instance, people who inject drugs, gay men, MSM and sex workers are roughly 30 times more likely to become infected with HIV.<sup>120</sup> Similarly, the likelihood of HIV infection is at least 10 times higher among transgender people.<sup>121</sup> This vulnerability to HIV infection observed among key populations is driven by various factors, including marginalisation, stigma and discrimination, all of which contribute to reduced access to health services.<sup>122</sup>

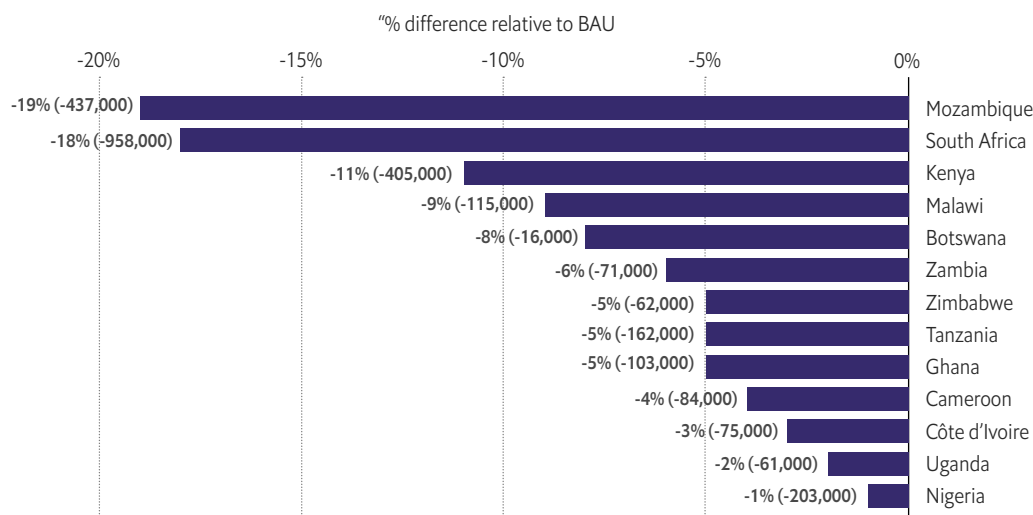
Assessing the impact of the response to HIV among key populations is of paramount importance in determining whether their needs are being met, particularly as these groups can be hard to reach.<sup>123</sup> However, this is often challenged by the limited data available on these key populations, especially within high-burden settings.<sup>124</sup> These data gaps preclude the ability to estimate the impact of HIV investments on these key and vulnerable populations. Moving forward, robust data is needed on these key populations to determine whether investments in the response to HIV are effective in addressing pre-existing inequalities and to ensure that these vulnerable groups are not left behind.

**Shifting the demographic profile**

The direct health impacts from investing in the response to HIV—both overall and within vulnerable populations—can create a sizeable shift in the overall demographic profile of a country across age and gender cohorts. A reduction in the number of new HIV infections and the number of people living with HIV results in significant human gains from reduced mortality—both mortality caused directly by AIDS as well as by other conditions that form comorbidities with HIV, such as TB.<sup>125</sup> For example, a study on the impacts of PEPFAR found a 20% reduction in all-cause mortality in countries supported by PEPFAR relative to countries without this support.<sup>126</sup> In line with research linking the response to HIV with reductions in deaths across the population, our study findings show a projected decline in all-cause mortality rates in a 100% funding scenario relative to a BAU scenario. Our estimates combine the direct reductions in AIDS-related mortality with spill-over effects on TB, which research suggests accounts for 32% of deaths among people with AIDS.<sup>127</sup>

The most pronounced relative decline in deaths is observed in Mozambique, where a 24% reduction in all-cause mortality across the population is estimated in 2030 if the funding targets are met; this translates to almost 65,000 deaths averted in a single year, and approximately 440,000 deaths averted between 2022-30 (see Figure 6). Mozambique is one of the countries with the highest burden of comorbidities with HIV, including TB-HIV, which may explain the substantial reduction in mortality estimated by our model.<sup>128</sup> In absolute terms, South Africa could see the largest decline, with almost 1m deaths averted between 2022 and 2030 (and 118,000 deaths averted in 2030 alone). This is unsurprising, given that South Africa is a country with both one of the highest disease burdens and the highest total level of funding dedicated to HIV under the 100% funding scenario, estimated at more than US\$24bn. These findings also align with a previous assessment by PEPFAR demonstrating that declines in all-cause mortality rates are greatest in countries with the highest levels of HIV investment.<sup>129</sup>

**Figure 6: Difference in all-cause mortality across all age groups under the 100% funding scenario compared to BAU (cumulative 2022-2030), % difference (absolute difference)**

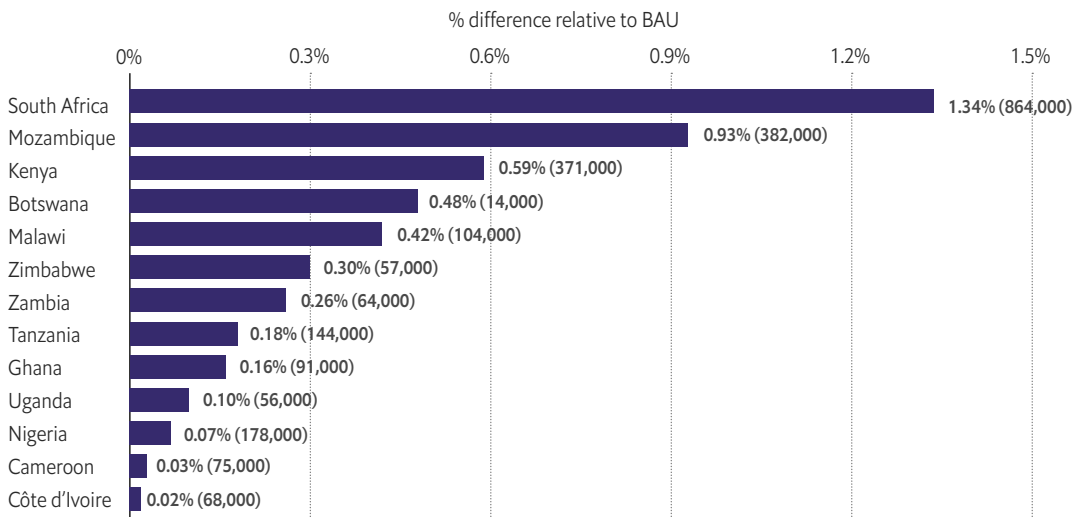


Source: Avenir Health; Economist Impact analysis

An immediate consequence of reductions in the mortality rate is a larger overall population size. Our findings show a larger projected population size by 2030 under a 100% funding scenario relative to BAU. This is primarily driven by reductions in mortality rates, which also contribute to higher birth rates resulting from

reduced mortality in women of child-bearing age.<sup>130</sup> The largest relative difference in population size is expected in South Africa and Mozambique, where the respective populations are estimated to be 1.3% and 0.9% larger in 2030 relative to a BAU scenario (see Figure 7).<sup>131</sup>

**Figure 7: Difference in total population size under the 100% funding scenario compared to BAU (2030), % difference (absolute difference)**

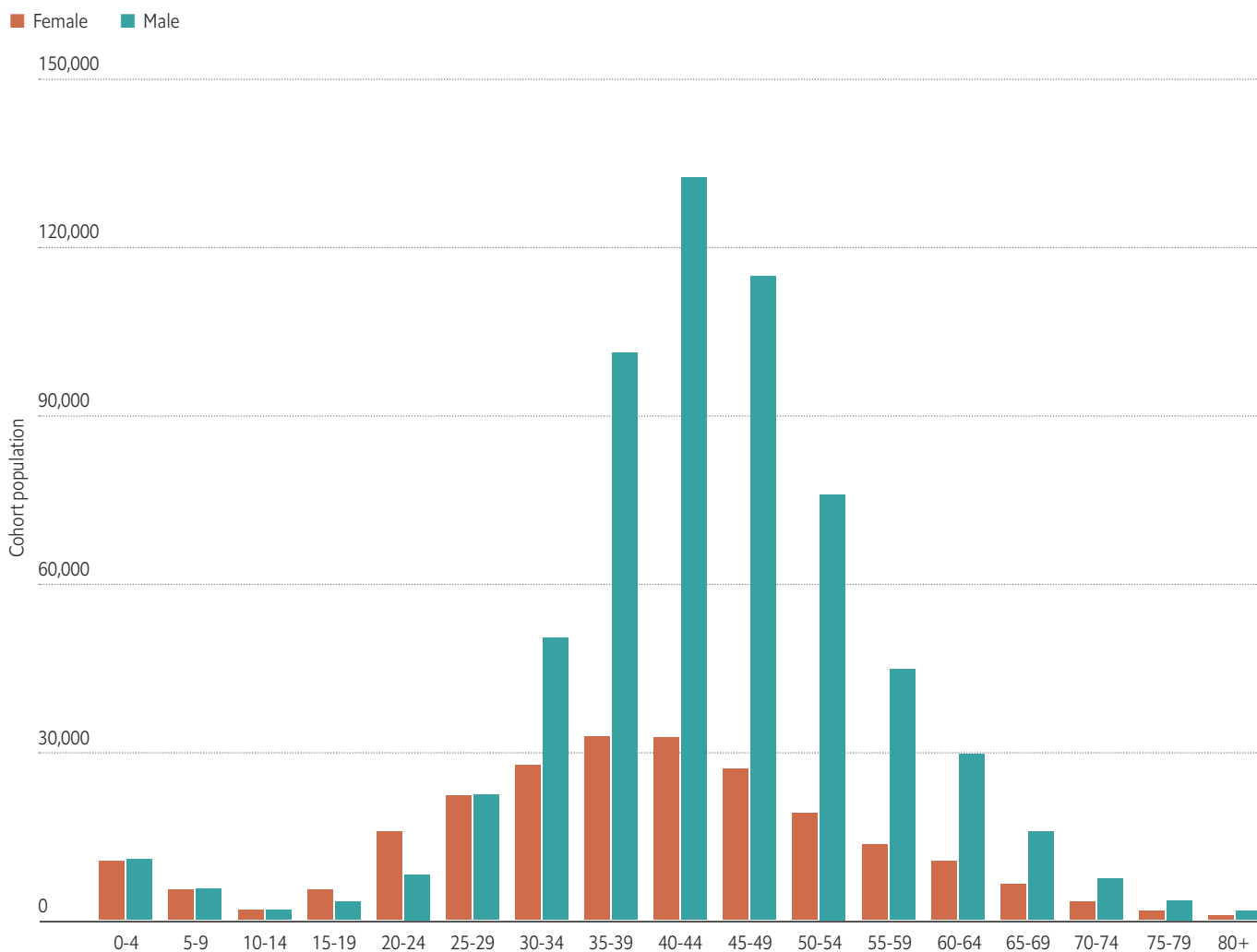


Source: Economist Impact analysis

Not only do the results indicate an increase in the overall size of populations, there are interesting changes in population structures observed (see Figure 8). Across all the study countries, the greatest difference in population size by 2030 compared to BAU is seen among those aged 30-64 (illustrated in Figure 8 for South Africa). This suggests that the greatest gains are expected to be concentrated among the working-age

population. For example, in South Africa increased investments in HIV could increase the size of the 30-64 cohort by an estimated 2.6% under a full funding scenario, compared with overall growth in the total population of 1.3%. Therefore, while the results show that women gain the most relatively, the largest absolute gains are among the male working age population.

**Figure 8: Difference in total population size in South Africa by age group and gender under 100% funding scenario, compared to BAU (2030)**



Source: Economist Impact analysis

Failure to protect the growth of working-age populations through enhanced financing of the response to HIV could further exacerbate the consequences of the constrained fiscal environment faced by these countries and result in lost opportunities for economic growth.

### Reaping the demographic dividend

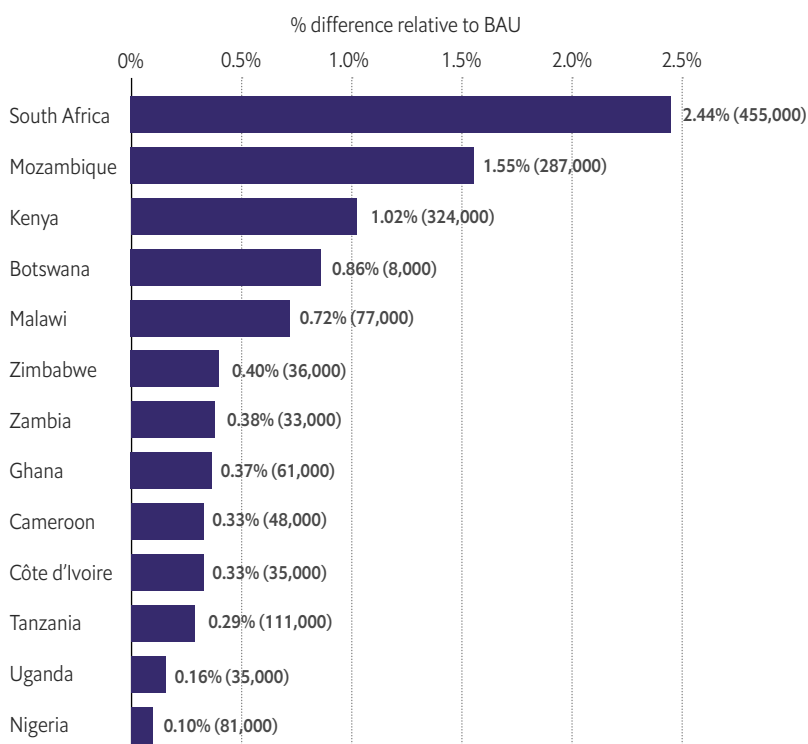
The changing population dynamics associated with investing in the response to HIV give rise to an opportunity to reap a “demographic dividend”, the growth resulting from shifts in the age structure of a population.<sup>132</sup> This growth could arise through various channels,

including through creating a larger share of the population with productive capacity, and a reduced share of dependents.<sup>133</sup> Our findings demonstrate that under a fully funded HIV response scenario, the dependency ratio could decline by almost 1 percentage point across the countries studied—in South Africa, for example, the number of dependents for every 100 people of working age could drop from 49 to 48.<sup>f</sup>

Historical evidence from east Asia illustrates a direct link between this growth in the share of the working-age population and economic growth.<sup>134</sup> Furthermore, based on IMF estimates, a 1 percentage point change in the working age population can lead to an increase in real GDP per capita of roughly 0.5 percentage points. Although the relationship between HIV and GDP per capita growth is somewhat ambiguous, there is strong evidence of the impact of HIV on human capital accumulation, itself linked to economic growth.<sup>135</sup> These impacts are even more pronounced in low-income countries in Africa, which have the potential to benefit the most from demographic transition.<sup>136</sup>

In general, a demographic dividend is primarily realised through an increase in supply of labour by the working-age population. Across all study countries, our findings demonstrate growth in the size of the working-age population and resulting growth in employment under a 100% funding scenario, relative to BAU. We estimate that South Africa and Kenya would see employment increases of 2.4% and 1% respectively in 2030, which translates to 455,000 and 324,000 additional people employed in each country (see Figure 9). The differences in impacts across countries are

**Figure 9: Difference in total employment under the 100% funding scenario compared to BAU (2030), % difference (absolute difference)**



Source: Economist Impact analysis

<sup>f</sup> The dependency ratio is the ratio of the population 65 years or over and below 15, to the population aged 15-64, presented as the number of dependents per 100 persons of working age (15-64).



driven by a combination of several factors, including their baseline HIV incidence, funding gaps and differences in population demographics.

In addition to the expected growth in employment numbers, HIV investments can also drive growth in the quality of employment through productivity gains. These productivity gains are the result of a combination of improved health and educational outcomes—both of which allow the future labour force to be more productive.<sup>137,138</sup> Studies show that chronic conditions can reduce the supply of labour not only through increased mortality, but also through reduced levels of productivity.<sup>139</sup> For instance, a study from Zambia and South Africa found that HIV-positive individuals are, on average, less productive than HIV-negative individuals.<sup>140</sup> The enhancement in human capital development through these channels, combined with growth in the size of the workforce, enables increased economic growth.

### Tangible economic gains

The health, demographic and social gains discussed so far in this chapter all contribute to higher GDP potential from enhanced HIV financing. The World Bank's Human Capital Index highlights the role played by three core dimensions of human capital development in economic development: having a long and healthy life, being knowledgeable, and having a decent standard of living.<sup>141</sup> As highlighted above, increased investment in response to HIV contributes to each of these dimensions by:

- reducing HIV incidence rates and mortality rates, thus increasing life expectancy and enabling individuals to lead longer and healthier lives;
- increasing access to education, resulting in better learning outcomes; and

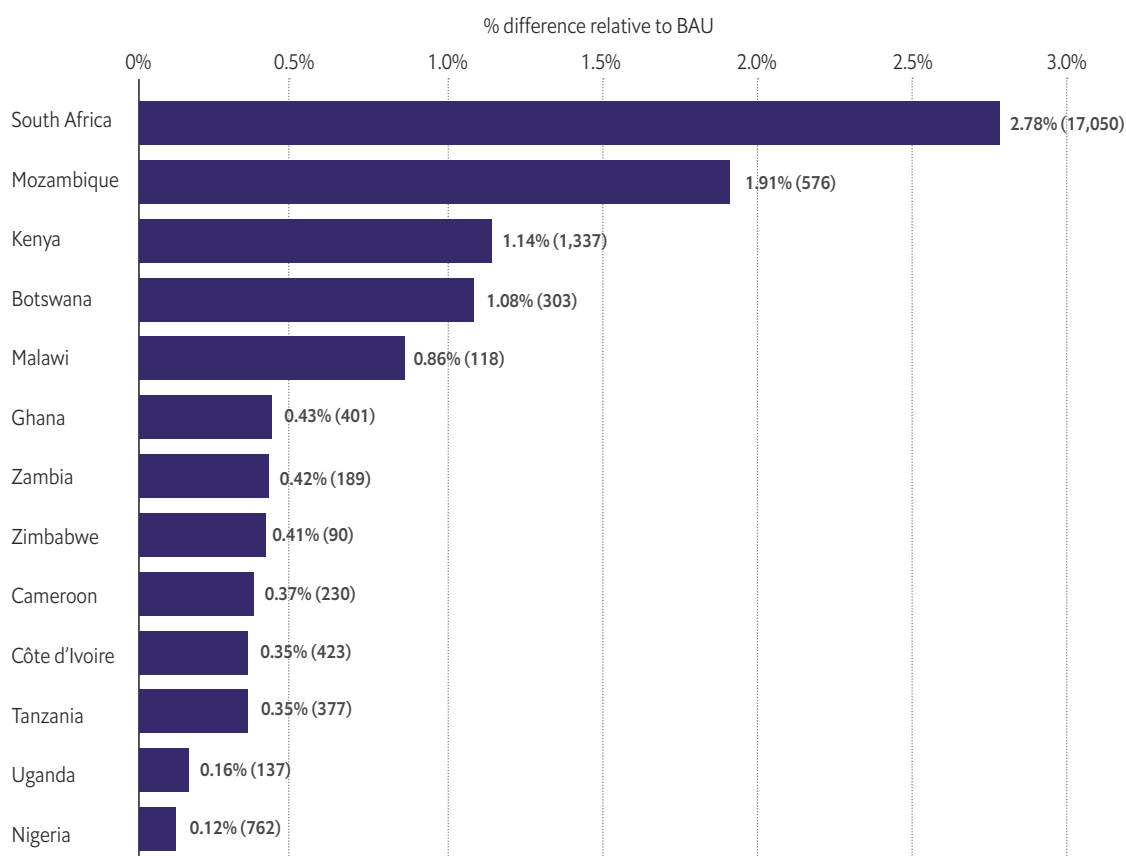
- reducing inequalities, enhancing quality of life by reducing the infection burden and improving labour market opportunities, all of which result in higher standards of living.

Our analysis measures how these gains through human capital accumulation result in higher GDP potential through two impacts on the labour market: an increase in the *quantity* of the labour force, and an increase in the *quality* of the labour force. The former is assessed based on an increase in employment driven by demographic shifts, while the latter is assessed based on the productivity gains resulting from improved health and educational outcomes. (Further detail on our methodology is provided in Appendix III.) We find substantial impacts on GDP across all study countries. By 2030, we estimate that GDP across these countries could be between 0.1-3% higher if HIV funding targets are met. Differences in the impacts observed across countries are driven by their burden of disease, the adequacy of current funding levels to meet targets, and their demographic and economic structures, which determine where the impacts are most likely to be felt.

Of the countries studied, the most significant impacts are expected in South Africa—with the highest burden of disease within the sample—where we estimate that GDP could be up to 2.8% higher in 2030 if HIV funding targets are met. This is equivalent to a gain of over US\$17bn in a single year (see Figure 10). Botswana, a country with a similar disease burden as South Africa, is expected to see a gain in GDP of 1.1%, or US\$0.3bn, in 2030. The economy of Botswana is heavily reliant on the service sector, which contributes the largest share of GDP.<sup>142</sup> It is therefore also less labour-intensive, with labour income accounting for 47% of GDP—compared with 56% in South Africa—partly explaining the lower magnitude of impact.<sup>§</sup>

§ Based on data extracted by Economist Impact from UN Statistics Division

**Figure 10: Difference in total GDP under the 100% funding scenario compared to BAU (2030), % difference (absolute difference, US\$ millions)**



Source: Economist Impact analysis

Even countries with lower disease burdens see substantial gains. For example, Kenya has a lower infection rate than Botswana (0.09% of the population is newly infected each year in Kenya, compared with 0.3% in Botswana). However, the GDP impacts when 100% of the HIV funding targets are met are of a similar order of magnitude. Kenya could see its GDP rise by 1.1%, or US\$1.3bn, in 2030 if HIV funding targets are met. With a labour-intensive economy in which the agriculture sector accounts for 40% of the labour force,

the boost in employment from increased HIV investments offers substantial opportunities for economic growth.<sup>143</sup>

Overall, our findings demonstrate a sizeable return on investment from the response to HIV. For example, in South Africa every additional dollar invested in the response to HIV between 2022 and 2030, could result in an estimated US\$7.20 in GDP gains over this period. These findings are closely aligned with those of other studies.<sup>144</sup>



Our model findings point towards wider social and economic gains channelled through positive health outcomes when funding targets for tackling HIV are met. Vice versa, they point to the losses that could be incurred if these targets are not met. Addressing the existing funding gaps and ensuring financing is provided at the level prescribed by the 2021 Political Declaration could significantly improve health outcomes, in terms of averting new HIV infections and related deaths. The health gains, in turn, could lead to demographic shifts and a larger overall population, contributing to a larger and more productive workforce, both today and in the future. Overall, these findings illustrate how enhancing investments towards HIV is a key ingredient of economic recovery, particularly in LMICs.

### **Wider system strengthening**

Beyond the economic gains to countries from enhanced HIV financing to meet set targets,

such investment can also contribute to strengthening health systems and supporting health security. Although these health system outcomes were not explicitly modelled within our study, insights gathered from expert interviews suggest that financing for the response to HIV played a crucial role in contributing to pandemic preparedness and response efforts, particularly within developing countries (see Box 1 in “A stall in progress” above). These wider system benefits can contribute to additional economic gains in the longer term, which are not captured within the analysis presented in this report.

The HIV epidemic has also had substantial impacts on the health sector, particularly in Sub-Saharan Africa, with public health spending for HIV alone accounting for almost a fifth of total health spending.<sup>145</sup> The HIV epidemic also impacts healthcare workers who may themselves be HIV-positive, which ultimately affects the overall supply of public

health services. These effects are even more pronounced in LMICs, which tend to face significant issues around shortages of health professionals.<sup>146</sup> Overall, the HIV epidemic poses significant challenges to health systems in developing countries, particularly those with a high HIV burden (see Box 3).

The gains on offer to health systems, societies and economies from meeting AIDS targets are clear. The next question is how they can be achieved. The following section discusses potential policy options towards the response to HIV, while recognising the constraints placed by the current economic and financing environment.

### BOX 3

#### Return on prevention: addressing the HIV epidemic in Sub-Saharan Africa

The HIV epidemic has resulted in significant costs on healthcare systems globally, particularly within low- and middle-income countries. The increased demand for care subsequently places large strains on the limited health resources of developing countries—the median lifetime cost of managing HIV in a low-income country has been estimated at more than US\$5,200 per patient, demonstrating the high costs of the HIV epidemic on fragile healthcare systems.<sup>147</sup> These findings shed light on the importance of public measures taken to mitigate the spread of HIV, particularly within developing countries.

Research by the World Health Organization (WHO) offers compelling evidence that preventative approaches represent a cost-effective strategy that holds the potential to offer large return on investments in both the short and long term.<sup>148</sup> Data from Sub-Saharan Africa suggest that HIV prevention strategies such as prevention of mother-to-child transmission and voluntary male circumcision are both cost effective and effective in reducing the transmission of HIV in the region.<sup>149,150</sup> The potential cost-effectiveness of other evidence-based prevention strategies, including pre-exposure prophylaxis (PrEP), has also been documented.<sup>151</sup> Furthermore, strategic approaches that involve investments in HIV health promotion and prevention interventions may also free up additional funding within the health sector.<sup>152</sup>

Looking ahead, these findings illustrate how investments made by governments today to control the spread of the HIV epidemic could have substantial implications in reducing healthcare system costs in the long term.



# The way forward

## Where do we go from here?

The findings stemming from our analysis illustrate that clear health, social and economic gains could be realised within countries in Sub-Saharan Africa by meeting the financing targets set out in the 2021 Political Declaration. Our discussions with experts suggest that investment directed towards the response to HIV could also play a key role in strengthening health systems and supporting health security more broadly, particularly in developing countries. This magnifies the importance of alignment and coordination between key stakeholders to secure the necessary resources to mount a sufficient response to HIV.

However, this is much easier said than done. Countries in the region are up against significant challenges to secure the availability of resources needed for the response to HIV in the face of concurrent shocks experienced over the past few years. The covid-19 pandemic has resulted in economies contracting and the domestic fiscal space narrowing, limiting the availability of HIV financing. Needless to say, governments face a bumpy road ahead with difficult decisions that will need to be made with respect to spending priorities.

What has also become increasingly apparent is that no conversation about creating a

sustainable response to HIV can take place without considering how the broader health financing landscape will be impacted in coming years. Projections by the World Bank indicate that it is not only the response to HIV that is in jeopardy but also the overall landscape for government spending on health. In an optimistic scenario, projected government spending within many countries is expected to recover to pre-covid per capita levels by 2027. However, in some countries, even this level of recovery is out of reach.<sup>153</sup> As a result, many countries are likely to face large constraints on their ability to spend on health and, consequently, the response to HIV.

To better illustrate the challenges ahead, we have mapped out the financing levels needed to meet the targets set out in the 2021 Political Declaration within four countries in Sub-Saharan Africa—Botswana, Kenya, Mozambique and South Africa—against the projected government per capita spending (based on the World Bank's assessment) as countries recover from the covid-19 pandemic (see Figure 11). In every instance, countries are not expected to meet the financing targets agreed by UN Member States based on the anticipated recovery from the pandemic. In many instances, they are only expected to marginally recover from BAU funding levels.

In order to ensure adequate financing for the response to HIV, and the health sector more broadly, innovative approaches will be needed. These approaches fall under two broad categories. First, policy approaches that aim to generate new revenue streams for health will be needed to address fiscal challenges. Second, alongside policies aimed at tapping into new resources, it will be equally important to consider approaches that maximise the effective utility of existing funds, resources and partnerships for high-priority health-sector activities, including the response to HIV. Creating mechanisms for sustainable and equitable health financing will be key to fostering health system resilience, advancing progress towards universal health care and ensuring that countries are adequately prepared to withstand future global shocks.

To achieve this, sustained political commitments will be needed. However, political commitment alone is not enough. It will need to be complemented by strong advocacy efforts among key stakeholders to ensure the removal of barriers to domestic financing for the response to HIV, and an equitable health agenda more broadly. This report demonstrates how investments made today in HIV foster downstream impacts on broader social and economic outcomes. This offers the impetus for greater political leadership around the response to HIV and broader health financing. Our findings should act as a catalyst for policy decisions that ensure sufficient financing of the response to HIV to meet the 2025 AIDS targets and that put countries on a pathway towards building resilient healthcare systems.

**Figure 11: Comparing HIV funding requirements (100% funding) with expected levels of funding in line with covid-19 recovery (World Bank assumptions)**



Source: Avenir Health; World Bank; Economist Impact analysis.<sup>h,154</sup>

<sup>h</sup> Projections of funding towards the HIV response in the business-as-usual and 100% funding scenarios have been provided by Avenir Health.

**“I think [boosting HIV funding in Sub-Saharan Africa] boils down to two things: ownership and political commitment.”**

Markus Haacker, non-residential fellow, Center for Global Development; fellow, Centre for Global Health Economics, University College London

## Looking back to move forward

This section provides an overview of the two broad strategies countries may consider including: (1) enhancing financing for health and the HIV response; and (2) maximising the effective utility of existing funds, resources and partnerships for high-priority health-sector activities, including the response to HIV. The strategies detailed below are by no means an exhaustive list, but rather present an overview of the most salient approaches arising from our interviews with field experts and our literature review. Additional due diligence is also needed to understand the specific implications of different policy options within the unique contexts of different countries before determining an appropriate course of action.

### 1. Enhancing financing for health and the response to HIV

#### 1.1 Earmarking health allocations within government budgets

One of the potential strategies that could be used to mobilise domestic resources for health includes earmarking domestic funding allocations for high-priority health-sector activities, including the response to HIV.<sup>155</sup> This involves separating a portion of total revenue and allocating it to a designated purpose. Earmarks have become a central component of discussions

around domestic resource mobilisation for health, particularly among countries transitioning from donor support and working towards broader health system goals.<sup>156</sup> Given the importance of investments in health in ensuring the longer-term economic recovery of countries, earmarks could be one strategy to support the mobilisation of domestic resources allocated to health, including the response to HIV.

A number of countries have utilised earmarking as a tool to mobilise domestic resources for health. For example, Ghana has more than a decade of experience with earmarking to fund its National Health Insurance Scheme (NHIS)—2.5% of revenue generated from value-added tax (VAT) and the Social Security and National Insurance Trust is earmarked for the NHIS.<sup>157</sup> These allocations have been widely recognised by key stakeholders as crucial to ensuring that a guaranteed stream of funding is allocated towards this national priority.<sup>158</sup> Specifically in the context of HIV, earmarking supported the mobilisation of resources to mount an effective domestic response in South Africa.<sup>159</sup>

The potential for enhanced health financing from earmarking government spending allocations could help to alleviate some of the impact of covid-19 on health spending and the response to HIV. Boosting domestic financing also has the potential to enhance countries' ownership of the response to HIV, a key facet in creating a sustainable response. However, careful consideration will be needed to evaluate how earmarks for health can be designed and implemented to align with country-specific contexts and priorities.

#### 1.2. Implementing measures to address tax evasion and recover lost revenue potential

Another key approach that can be used to support domestic resource mobilisation is the implementation of measures designed to tackle

**“South Africa and the Philippines have great experiences to share. There is strong evidence that health taxes have worked in certain settings, and there are modelling exercises [indicating] that health taxes could generate significant resources.”**

Kalipso Chalkidou, head of health finance, The Global Fund to Fight AIDS, Tuberculosis and Malaria; visiting professor, Imperial College London

tax evasion. The OECD estimates that Africa loses roughly US\$50bn to tax evasion annually.<sup>160</sup> Currently, mineral and oil extraction companies are responsible for much of the tax evasion happening in Sub-Saharan Africa, which amounts to annual losses of roughly 6% of Africa's GDP.<sup>161</sup> Tax evasion deprives governments of significant resources that can be put towards public health spending, including the response to HIV.

In response to this issue, the OECD Base Erosion and Profit Shifting initiative was launched in 2023 in conjunction with more than 115 countries, negotiating a comprehensive set of measures aimed at tackling tax evasion and avoidance. Since then, a number of countries have taken steps to implement these measures, including South Africa and Nigeria, to enable stronger revenue mobilisation, particularly within resource-constrained settings.<sup>162</sup> The additional tax revenue generated through these measures has the potential to support the expansion of health budgets and the delivery of critical healthcare services, including HIV services.

### **1.3. Enhancing the financial support offered by international financial institutions**

Efforts by individual countries to secure financing for the response to HIV could be further enhanced through additional support from international financial institutions. As it stands, the financial support offered by these institutions currently represents less than half of what developing countries paid to service

their debts between 2020 to 2021, which amounted to roughly US\$650bn.<sup>163</sup> Support for the mobilisation of additional resources from international financial institutions is needed as countries grapple with heavy debt burdens and constrained health budgets. When used to support the response to HIV, these resources could subsequently contribute towards supporting wider health security and the strengthening of health systems.

Recently, the World Bank approved a new financial intermediary fund (FIF) aimed at stepping up investments to strengthen the capacity of developing countries to prevent, prepare for and respond to future pandemics.<sup>164</sup> Given the fundamental role that existing systems from the response to HIV have played in supporting health security in developing countries during covid-19 pandemic, HIV financing should be included within the list of activities eligible for funding by the World Bank's FIF.<sup>165</sup> This would allow countries to further leverage and enhance existing resources that have been used to support health security, while simultaneously enhancing the sustainability of the response to HIV.<sup>166</sup>

Existing facilities of financial institutions could also be leveraged to enhance investments in the HIV response and health more broadly. For instance, the International Monetary Fund (IMF) has recently established the Resilience and Sustainability Trust to provide support and



## “[Implementing pro-health taxes] takes political will and is not something that can happen without the political backing.”

Kalipso Chalkidou, head of health finance, The Global Fund to Fight AIDS, Tuberculosis and Malaria; visiting professor, Imperial College London

financing for low- and middle-income countries to address long-term challenges, including pandemic preparedness and response.<sup>167</sup>

### 1.4. Introducing pro-health taxes to generate revenue for healthcare spending

Another way in which new streams of revenue could potentially be generated, according to experts, is through the implementation of pro-health taxes. The WHO has consistently promoted pro-health taxes as a highly effective policy instrument both to reduce the consumption of harmful substances, including tobacco and alcohol, and to produce government revenue.<sup>168</sup> For instance, analysis of the impact of taxes on tobacco, alcohol and sugary drinks in South Africa, the Philippines and Mexico has demonstrated an increase in revenue and a reduction in demand for these products.<sup>169</sup> In South Africa, taxes on alcoholic beverages were increased each year from 2006 to minimise the harms associated with excessive alcohol consumption. Data show that the country's alcohol taxes led to a 33% increase in real revenue by 2016, while also reducing alcohol consumption by 13.5%.<sup>170</sup>

Revenue from pro-health taxes could potentially help to mitigate some of the impact of the covid-19 pandemic on health spending—and specifically spending towards the response to HIV—particularly in LMICs. Furthermore, when longer-term health gains are considered, pro-health taxes are expected to deliver the majority of their benefits to lower-income groups, helping to address health inequalities across the population.<sup>171</sup>

Beyond the revenue that could be generated through pro-health taxes to enhance health financing, these taxes can play an important role in improving population health outcomes by reducing the use of harmful substances such as tobacco and alcohol.<sup>172</sup> Tobacco use among people with HIV has been linked to a higher risk of various chronic diseases and a poorer response to HIV treatment.<sup>173</sup> Furthermore, alcohol consumption has been associated with a higher risk of HIV infection.<sup>174</sup> In this sense, pro-health taxes can generate revenue to support the response to HIV while also simultaneously directly reducing the burden of disease.

However, the political support for pro-health taxes is likely to play an important role in the feasibility of implementing this type of policy measure.<sup>175</sup> Part of the pushback stems from a view that health taxes are regressive in nature and place a larger burden on lower-income groups.<sup>176</sup> It will be important to weigh the short-term costs against the longer-term benefits to assess the feasibility of pro-health taxes at a country level.

### 1.5. Fostering alignment and coordination between key stakeholders using a multi-sectoral financing approach

Alignment between key stakeholders involved in the response to HIV—both within countries, and between governments and international donors—is another critical component of bolstering its sustainability. One way in which key stakeholders can build synergies that ultimately allow countries to meet national goals is through the implementation of co-financing arrangements using a multi-sectoral approach.<sup>i</sup>

<sup>i</sup> Co-funding arrangements are an approach whereby two or more sectors or budget holders jointly co-fund an intervention or broader investment area.

The findings from our study demonstrate the potential impacts of the response to HIV across sectors—while the health sector benefits directly, the education sector is also impacted, with knock-on economic implications through labour-market responses. Vice versa, increased investments in other sectors can also strengthen the response to HIV. Increased social care spending that reduces poverty, for example, can help to address a key risk factor for HIV vulnerability.<sup>177</sup> Similarly, investments that enable more girls to enrol and remain in school can also reduce the risk of HIV infection within this group.<sup>178</sup>

Co-financing arrangements that utilise a multi-sectoral approach, where feasible, can enhance the mobilisation of domestic resources while facilitating engagement with key country stakeholders involved in the response to HIV. Since introducing co-financing policies within the Global Fund, total commitments towards HIV, AIDS, TB and malaria in recipient countries has almost tripled since 2012.<sup>179</sup> This approach was also found to be effective in developing meaningful relationships between international donor organisations and governments, including, for example, between health ministers and finance ministers. Furthermore, multi-sectoral approaches can be effective in breaking down silos in resource allocation by taking a more holistic approach to the budgeting process.<sup>180</sup> Multi-sectoral approaches have also been shown to foster greater equity.<sup>181,182</sup>

Multi-sectoral strategies and co-financing arrangements require novel and integrated approaches to budgeting. However, they have often proven difficult to implement.<sup>183,184</sup> A key challenge is to determine what share of funding should come from international donors versus domestic sources—a decision that in all

likelihood will need to be tailored to country-specific contexts.<sup>185</sup>

## **2. Maximising the effective and equitable use of existing resources and partnerships**

### **2.1. Moving towards an integrated health service model**

One strategy that has been proposed to boost the sustainability of the response to HIV is moving towards an integrated service delivery model.<sup>j</sup> Closer integration of HIV and relevant health services holds the potential to enhance the accessibility and uptake of services in a way that is equitable and enables stigma-free access to key populations, while offering a more people-centred approach to care. Furthermore, integrated health service models have consistently been found to be more cost-effective.<sup>186</sup>

The integration of HIV and AIDS services with other health services has been linked to better health outcomes and better health system outcomes. For instance, there is strong evidence that integrating maternal and child health services with HIV and AIDS services can result in significant improvements in HIV and AIDS service uptake while enhancing child and maternal health outcomes.<sup>187</sup> Similarly, data stemming from Sub-Saharan Africa have shown that the integration of TB and HIV and AIDS services can result in greater uptake of HIV testing and counselling, higher initiation of ART treatment and greater retention in HIV care.<sup>188</sup>

At the same time, an integrated and people-centred health service model can serve to support and strengthen the response to HIV.<sup>189</sup> Data from Sub-Saharan Africa show that integration of non-communicable diseases (NCDs) into HIV care can reduce HIV-related

<sup>j</sup> Integration refers to the joining of two or more health services that were previously separated (e.g., being delivered by different healthcare providers, being delivered across different locations).



**“A big problem in low- and middle-income countries in Africa is this reliance on private out-of-pocket spending.”**

senior official, National Treasury of South Africa

stigma, enabling more equitable access to care among key populations.<sup>190,191</sup>

Overall, evidence stemming from Sub-Saharan Africa supports the utility of an integrated health service model, particularly when efforts are channelled towards leveraging existing HIV infrastructure and systems.<sup>192</sup> However, it is important to note that the feasibility and design of an integrated service delivery model is highly context-specific and contingent upon a range of factors, including the existing health system structures and processes. The design and implementation of integrated health service models will also need to carefully consider the needs of key populations who are disproportionately affected by HIV to ensure that equitable access to care is maintained.

## **2.2. Integrating HIV and AIDS services into national health financing**

The integration of HIV and AIDS services into national health financing is a key strategy that has been proposed to boost the sustainability of the global response to HIV while simultaneously advancing progress towards universal health coverage (UHC).<sup>193</sup> UHC is a globally agreed framework designed to deliver a package of healthcare services in a manner that enhances the quality of healthcare delivery and improves equitable access to care. The integration of HIV into health benefit packages can allow countries to gradually shift to national ownership of financing where programmes are currently

relying on external funding, thus ensuring the sustainability of the response to HIV.<sup>194</sup>

Furthermore, this integration could result in lower levels of out-of-pocket payments for households—for example, one study conducted in Ghana estimates an 86% reduction in household out-of-pocket payments through enrolment in the country’s national health insurance scheme.<sup>195</sup> High out-of-pocket cost for healthcare is a common issue in LMICs in Sub-Saharan Africa. One meta-analysis found that one in six households in the region faced catastrophic health expenditure while seeking health services between 2000 and 2019.<sup>196</sup> A reduction in these costs from integrating HIV and AIDS services could protect vulnerable lower-income groups from facing catastrophic expenses when seeking treatment for HIV, thereby advancing equitable access to healthcare services.

Thailand is an example of a country that has been internationally recognised for successfully integrating HIV and AIDS services into a benefits package as part of its Universal Coverage Scheme. Services include counselling and testing, prevention of mother-to-child transmission, lab testing to monitor HIV treatment, and positive prevention (i.e., a method of reducing HIV transmission by involving people with HIV in prevention strategies). AIDS-related deaths reduced by 60% in Thailand between 2004 and 2020, with the integration of HIV and AIDS services taking place in 2006.<sup>197</sup> Furthermore, the coverage of

people living with HIV who were receiving ART rose from 42% to 61% between 2010 and 2014. Key factors that enabled Thailand's success include sustained political commitment, sound public financing, national ownership and strong engagement from civil society.<sup>198</sup>

Botswana has also made substantial progress in addressing the HIV epidemic by integrating services. In 2016 the country adopted the "Treat All" strategy, which offered all HIV-positive citizens access to free ART in order to reduce the spread of the virus. The strategy was deemed a success, with more than 97% of patients on ART achieving viral suppression and incidence rates dropping to less than 1% in 2021.<sup>199</sup>

**“What I really feel is that the private sector, under the right incentives, can solve a number of these big problems, whether the last-mile solution problems, whether they are diagnostic problems, whether they are service delivery problems.”**

Allyala Nandakumar, academic director, Global Studies Division, Brandeis University; director, Institute of Global Health; senior advisor, USAID Health Office India



### **2.3. Engaging in public-private partnerships to enhance capacity of the healthcare workforce and strengthen health infrastructure**

The private sector can play a valuable role in achieving a sustainable and equitable response to HIV. Through public-private partnerships (PPPs), the private sector has contributed its knowledge and skills in areas such as logistics, supply chain management, research and manufacturing.<sup>200</sup> In the health sector, these types of partnerships have the potential to strengthen health systems by enhancing the capacity of the healthcare workforce and health infrastructure within developing countries in Sub-Saharan Africa.<sup>201</sup>

There are various examples of PPPs that have supported the strengthening of health systems in Sub-Saharan Africa. For instance, a PPP between the Ministry of Health and Social Welfare of Tanzania and Abbott Fund, a philanthropic foundation operated by Abbott Laboratories, was established to address the growing HIV epidemic. This PPP resulted in the development of 23 regional-level labs and an outpatient centre serving 1000 patients per day. This subsequently contributed towards a ten-fold increase in testing over the span of five years and enhanced access to healthcare services among people living with HIV and other chronic conditions.<sup>202</sup> Another successful example of a PPP is an agreement between Roche, Unitaid and the Clinton Health Access Initiative (CHAI), which allowed for the development of Turn Key Laboratories, an initiative to provide timely access to HIV testing for the paediatric population. This partnership resulted in 900,000 HIV tests being made available in addition to 100 labs in Sub-Saharan Africa offering routine testing for early-infant diagnosis.<sup>203</sup> These examples illustrate how collaboration with the private sector, under the right conditions, could potentially contribute

to the long-term sustainability of the response to HIV.<sup>204</sup>

#### 2.4. Establish community-led response to HIV as a means of enhancing equitable access to care

Community-led responses play a critical role in providing tailored HIV and AIDS services to underserved communities, delivering last-mile services and supporting community-based HIV prevention, testing and treatment services.<sup>205</sup> Furthermore, community-led responses play a fundamental role in ensuring that communities, and their needs and voices, remain at the forefront of the response to HIV.<sup>206</sup> Ultimately, this can help to tackle existing inequalities, particularly among vulnerable sub-groups.

Community leadership in the monitoring of the response to HIV/AIDS can also play an important role in enhancing accountability. Community-led monitoring allows communities

to work in tandem with healthcare providers and decision-makers to propose solutions to critical issues, including barriers to access and quality of care. Evidence to date suggests that community-led monitoring is an effective instrument in ensuring that HIV and AIDS services remain stigma-free for all individuals.<sup>207</sup>

Community-led models of care have shown success in countries within Sub-Saharan Africa. Sierra Leone observed a large increase in HIV testing among key populations—including men who have sex with men, female sex workers, people who inject drugs and young people—within a year of introducing a community-led monitoring system.<sup>208</sup> In Mali, the implementation of community-led monitoring systems led to improved treatment monitoring for individuals on ART.<sup>209</sup> These findings illustrate the importance of drawing on these existing community-centred networks to enhance HIV prevention and treatment and subsequently contribute towards health system strengthening.

These findings illustrate the importance of drawing on existing community-centred networks to enhance HIV prevention and treatment and subsequently contribute towards health system strengthening. They also highlight the need, moving forward, for appropriate investments in community-led responses that play a large role in allowing for a sustainable HIV response. The integration of community-led responses into national health financing policies and systems could support this effort.<sup>210</sup>

**“What we are seeing working [to enhance the sustainability of the response to HIV] is where investments have been placed into communities.”**

Lillian Mworeko, executive director, International Community of Women living with HIV Eastern Africa

# Conclusion

A host of global shocks, including the covid-19 pandemic, have led to a slowdown in progress towards the HIV response. The economic conditions and rising debt levels brought on by these concurrent shocks have served to constrain financing for responses to HIV and health more broadly. As a result, countries are currently unlikely to meet the targets noted in the 2021 Political Declaration unless they take further action.

Our findings demonstrate the potential for a large decline in the number of new HIV infections that emerge each year—particularly in countries with a high burden of disease—if the response to HIV is fully financed in line with the targets set in the 2021 Political Declaration. Our findings also indicate that young girls and women, who are disproportionately impacted by the HIV epidemic, stand to gain the most in relative terms from enhanced financing for the response to HIV. These findings shed light on the potential benefits that could be realised in reducing inequalities and addressing gender disparities through investment in the response to HIV.

Beyond reducing the substantial human costs of failing to meet these targets, our analysis shows the positive social and economic consequences of a fully funded response to HIV. Boosting investments is associated with improvements in educational outcomes among children and adolescents—again, young girls stand to benefit the most with respect to educational gains. Improvements in health and social outcomes when the AIDS targets are met could also subsequently bring about economic benefits. These gains are achieved by virtue of growth in the size of the current and future labour force—driven by reduced mortality and increased economic participation—and improvements in human capital. Collectively, our findings suggest that increasing investment in the response to HIV is a key component of economic recovery, specifically within LMICs.

These findings demonstrate that making investments today in the response to HIV can free up scarce resources going forward to address other health priorities. This highlights the importance of investment in the response to HIV in contributing towards enhancing pandemic preparedness and response, particularly within resource-constrained settings. These wider system benefits can contribute to additional economic gains in the longer term.

However, countries in Sub-Saharan Africa are facing significant fiscal challenges to secure the necessary resources, and the funding gap is rapidly widening. As such, innovative strategies will be needed to enhance sustainable financing for the HIV response and for health more broadly. These could fall under two broad strategies—first, securing additional financing for the health sector and, within that, the response to HIV; and second, maximising the effective utility of funding, resources and partnerships in addressing the HIV epidemic. However, it is important to note that the feasibility and design of policy measures will be contingent upon a range of country-specific factors, including existing health system resources and infrastructure, and current sources of funding, both domestic and international.

# Appendix I.

## Tables and figures

**Table A1.1. Number of new annual HIV infections, 2030**

| Country       | Scenario 0:<br>Business-as-usual        | Scenario 1:<br>100% funding             |                                      | Total cases averted<br>(2022-30) |
|---------------|---|---|--------------------------------------|----------------------------------|
|               | Number of new HIV<br>infections in 2030 | Number of new HIV<br>infections in 2030 | Change relative to<br>scenario 0 (%) |                                  |
| Botswana      | 9,660                                   | 3,950                                   | -5,700 (-59%)                        | 40,670                           |
| Cameroon      | 14,900                                  | 5,100                                   | -9,700 (-65%)                        | 83,600                           |
| Côte d'Ivoire | 12,800                                  | 3,800                                   | -9,000 (-71%)                        | 75,600                           |
| Ghana         | 24,200                                  | 2,900                                   | -21,300 (-88%)                       | 154,000                          |
| Kenya         | 54,200                                  | 15,100                                  | -39,200 (-72%)                       | 322,500                          |
| Malawi        | 25,000                                  | 9,300                                   | -15,800 (-63%)                       | 118,600                          |
| Mozambique    | 136,300                                 | 25,700                                  | -110,600 (-81%)                      | 809,900                          |
| Nigeria       | 54,300                                  | 15,500                                  | -38,700 (-71%)                       | 302,200                          |
| South Africa  | 248,600                                 | 68,800                                  | -179,800 (-77%)                      | 1,353,100                        |
| Tanzania      | 36,800                                  | 16,100                                  | -20,600 (-56%)                       | 158,200                          |
| Uganda        | 22,700                                  | 13,700                                  | -8,900 (-39%)                        | 72,800                           |
| Zambia        | 31,300                                  | 16,500                                  | -14,800 (-47%)                       | 113,500                          |
| Zimbabwe      | 18,500                                  | 11,000                                  | -7,500 (-41%)                        | 61,200                           |

Table A1.2. Number of people living with HIV, 2030

| Country       | Scenario 0:<br>Business-as-usual                 | Scenario 1:<br>100% funding                      |                                   |                               |
|---------------|--|--|-----------------------------------|-------------------------------|
|               | People living with HIV in 2030 (% of population) | People living with HIV in 2030 (% of population) | Change relative to scenario 0 (%) | Total cases averted (2022-30) |
| Botswana      | 395,200 (13%)                                    | 365,000 (12%)                                    | -30,200 (-7.6%)                   | 134,700                       |
| Cameroon      | 494,000 (1.5%)                                   | 466,600 (1.4%)                                   | -27,400 (-5.5%)                   | 143,000                       |
| Côte d'Ivoire | 398,500 (1.2%)                                   | 372,900 (1.1%)                                   | -25,600 (-6.4%)                   | 120,300                       |
| Ghana         | 426,100 (1.1%)                                   | 340,500 (0.9%)                                   | -85,500 (-20.1%)                  | 386,300                       |
| Kenya         | 1,727,500 (2.7%)                                 | 1,681,500 (2.6%)                                 | -46,000 (-2.7%)                   | 234,000                       |
| Malawi        | 1,067,100 (4.3%)                                 | 1,025,700 (4.1%)                                 | -41,400 (-3.9%)                   | 188,500                       |
| Mozambique    | 2,864,200 (7.0%)                                 | 2,340,000 (5.7%)                                 | -524,100 (-18.3%)                 | 2,413,900                     |
| Nigeria       | 1,638,300 (0.6%)                                 | 1,473,000 (0.6%)                                 | -165,300 (-10.1%)                 | 801,100                       |
| South Africa  | 80,070,700 (12%)                                 | 7,359,700 (11%)                                  | -710,900 (-8.8%)                  | 3,174,300                     |
| Tanzania      | 1,671,500 (2.0%)                                 | 1,621,900 (2.0%)                                 | -49,600 (-3.0%)                   | 234,800                       |
| Uganda        | 1,383,700 (2.4%)                                 | 1,351,400 (2.3%)                                 | -32,400 (-2.3%)                   | 145,500                       |
| Zambia        | 1,385,400 (5.6%)                                 | 1,318,700 (5.3%)                                 | -66,700 (-4.8%)                   | 302,200                       |
| Zimbabwe      | 1,150,400 (6.0%)                                 | 1,130,900 (5.9%)                                 | -19,500 (-1.7%)                   | 92,900                        |

Table A1.3. Number of AIDS-related deaths, 2030

| Country       | Scenario 0:<br>Business-as-usual | Scenario 1:<br>100% funding |                                   |                                |
|---------------|----------------------------------|-----------------------------|-----------------------------------|--------------------------------|
|               | AIDS-related deaths in 2030      | AIDS-related deaths in 2030 | Change relative to scenario 0 (%) | Total deaths averted (2022-30) |
| Botswana      | 5,000                            | 3,400                       | -1,600 (-32%)                     | 11,300                         |
| Cameroon      | 11,800                           | 3,900                       | -7,900 (-67%)                     | 57,500                         |
| Côte d'Ivoire | 10,800                           | 4,100                       | -6,700 (-62%)                     | 51,800                         |
| Ghana         | 12,200                           | 2,300                       | -9,900 (-81%)                     | 70,200                         |
| Kenya         | 46,300                           | 9,700                       | -36,600 (-79%)                    | 281,300                        |
| Malawi        | 18,100                           | 7,600                       | -10,400 (-58%)                    | 78,000                         |
| Mozambique    | 58,600                           | 14,600                      | -44,100 (-75.2%)                  | 297,600                        |
| Nigeria       | 29,900                           | 9,900                       | -20,000 (-66.9%)                  | 138,700                        |
| South Africa  | 115,600                          | 33,800                      | -81,700 (-70.7%)                  | 661,400                        |
| Tanzania      | 24,800                           | 9,300                       | -15,500 (-62.3%)                  | 111,700                        |
| Uganda        | 13,000                           | 8,200                       | -4,800 (-37.1%)                   | 41,500                         |
| Zambia        | 13,200                           | 7,100                       | -6,200 (-46.5%)                   | 48,500                         |
| Zimbabwe      | 10,900                           | 5,700                       | -5,200 (-47.9%)                   | 43,100                         |



Table A1.4. Total population, 2030 (millions)

| Country       | Scenario 0:<br>Business-as-usual | Scenario 1:<br>100% funding |                                      |   |
|---------------|----------------------------------|-----------------------------|--------------------------------------|---|
|               | Population in 2030<br>(m)        | Population in 2030<br>(m)   | Change relative to<br>scenario 0 (%) | Total change in<br>population (2022-30) |
| Botswana      | 2.97                             | 2.99                        | 14,300 (+0.5%)                       | 51,400                                  |
| Cameroon      | 34.05                            | 34.13                       | 74,900 (+0.2%)                       | 287,900                                 |
| Côte d'Ivoire | 34.21                            | 34.28                       | 67,800 (+0.2%)                       | 269,100                                 |
| Ghana         | 38.78                            | 38.87                       | 90,600 (+0.2%)                       | 349,600                                 |
| Kenya         | 63.1                             | 63.5                        | 370,000 (+0.6%)                      | 1,474,900                               |
| Malawi        | 24.94                            | 25.05                       | 104,300 (+0.4%)                      | 401,300                                 |
| Mozambique    | 40.9                             | 41.3                        | 381,800 (+0.9%)                      | 1,417,100                               |
| Nigeria       | 262.6                            | 262.8                       | 178,400 (+0.07%)                     | 661,500                                 |
| South Africa  | 64.66                            | 65.52                       | 863,700 (+1.3%)                      | 3,395,000                               |
| Tanzania      | 81.89                            | 82.0                        | 144,100 (0.2%)                       | 543,400                                 |
| Uganda        | 58.38                            | 58.44                       | 56,100 (+0.1%)                       | 229,400                                 |
| Zambia        | 24.67                            | 24.74                       | 63,700 (+0.3%)                       | 248,200                                 |
| Zimbabwe      | 19.18                            | 19.24                       | 56,700 (+0.3%)                       | 230,900                                 |

Table A1.5. Number of children in school, 2030

| Country       | Scenario 0:<br>Business-as-usual | Scenario 1:<br>100% funding |                                   |
|---------------|----------------------------------|-----------------------------|-----------------------------------|
|               | Children in school in 2030       | Children in school in 2030  | Change relative to scenario 0 (%) |
| Botswana      | 724,200                          | 726,700                     | 2,500 (+0.3%)                     |
| Cameroon      | 9,769,200                        | 9,784,200                   | 15,000 (+0.2%)                    |
| Côte d'Ivoire | 7,982,900                        | 7,990,900                   | 7,500 (+0.1%)                     |
| Ghana         | 10,943,800                       | 10,962,900                  | 19,100 (+0.2%)                    |
| Kenya         | 18,702,300                       | 18,769,300                  | 67,300 (+0.4%)                    |
| Malawi        | 8,279,500                        | 8,302,300                   | 22,800 (+0.3%)                    |
| Mozambique    | 11,459,900                       | 11,456,800                  | 85,900 (+0.8%)                    |
| Nigeria       | 53,943,400                       | 53,980,000                  | 36,600 (+0.07%)                   |
| South Africa  | 15,896,500                       | 16,027,100                  | 130,600 (+0.8%)                   |
| Tanzania      | 19,127,000                       | 19,155,200                  | 28,100 (+0.2%)                    |
| Uganda        | 14,447,200                       | 14,451,500                  | 4,300 (+0.03%)                    |
| Zambia        | 5,302,400                        | 5,310,100                   | 7,700 (+0.2%)                     |
| Zimbabwe      | 5,480,800                        | 5,485,000                   | 4,200 (+0.08%)                    |

Table A1.6. Number of people employed, 2030 (millions)

| Country       | Scenario 0:<br>Business-as-usual |  | Scenario 1:<br>100% funding |                                   |
|---------------|----------------------------------|--|-----------------------------|-----------------------------------|
|               | Employment in 2030 (m)           |  | Employment in 2030 (m)      | Change relative to scenario 0 (%) |
| Botswana      | 0.97                             |  | 0.98                        | 8,300 (+0.9%)                     |
| Cameroon      | 14.6                             |  | 14.7                        | 47,900 (+0.3%)                    |
| Côte d'Ivoire | 10.67                            |  | 10.7                        | 35,200 (+0.3%)                    |
| Ghana         | 16.24                            |  | 16.30                       | 60,700 (+0.4%)                    |
| Kenya         | 31.8                             |  | 32.1                        | 324,000 (+1.0%)                   |
| Malawi        | 10.6                             |  | 10.7                        | 77,000 (+0.7%)                    |
| Mozambique    | 18.59                            |  | 18.88                       | 287,500 (+0.2%)                   |
| Nigeria       | 80.16                            |  | 80.24                       | 80,800 (+0.1%)                    |
| South Africa  | 18.68                            |  | 19.12                       | 455,100 (+2.4%)                   |
| Tanzania      | 38.47                            |  | 38.59                       | 110,700 (+0.3%)                   |
| Uganda        | 22.27                            |  | 22.31                       | 34,600 (+0.2%)                    |
| Zambia        | 8.92                             |  | 8.95                        | 33,500 (+0.4%)                    |
| Zimbabwe      | 9.03                             |  | 9.06                        | 35,700 (+0.4%)                    |

Table A1.7. Gross Domestic Product, 2030 (US\$ millions)

| Country       | Scenario 0:<br>Business-as-usual |                        | Scenario 1:<br>100% funding |                                   |                        |
|---------------|----------------------------------|------------------------|-----------------------------|-----------------------------------|------------------------|
|               | GDP in 2030 (m)                  | GDP per capita in 2030 | GDP in 2030 (m)             | Change relative to scenario 0 (%) | GDP per capita in 2030 |
| Botswana      | 27,900                           | 9,420                  | 28,300                      | 300 (+1.1%)                       | 9,470                  |
| Cameroon      | 62,800                           | 1,840                  | 63,000                      | 230 (+0.4%)                       | 1,850                  |
| Côte d'Ivoire | 119,800                          | 3,500                  | 120,200                     | 420 (+0.4%)                       | 3,510                  |
| Ghana         | 92,300                           | 2,380                  | 92,700                      | 400 (+0.4%)                       | 2,385                  |
| Kenya         | 116,800                          | 1,850                  | 118,200                     | 1,300 (+1.1%)                     | 1,860                  |
| Malawi        | 13,800                           | 554                    | 13,900                      | 100 (+0.9%)                       | 556                    |
| Mozambique    | 30,100                           | 736                    | 30,700                      | 600 (+1.9%)                       | 743                    |
| Nigeria       | 645,000                          | 2,456                  | 645,800                     | 800 (+0.1%)                       | 2,458                  |
| South Africa  | 614,400                          | 9,500                  | 631,400                     | 17,100 (+2.8%)                    | 9,640                  |
| Tanzania      | 109,000                          | 1,331                  | 109,300                     | 400 (+0.4%)                       | 1,333                  |
| Uganda        | 83,300                           | 1,426                  | 83,400                      | 100 (+0.2%)                       | 1,427                  |
| Zambia        | 44,800                           | 1,816                  | 45,000                      | 200 (+0.4%)                       | 1,819                  |
| Zimbabwe      | 22,100                           | 1,154                  | 22,200                      | 100 (+0.4%)                       | 1,155                  |

## Appendix II. Country profiles





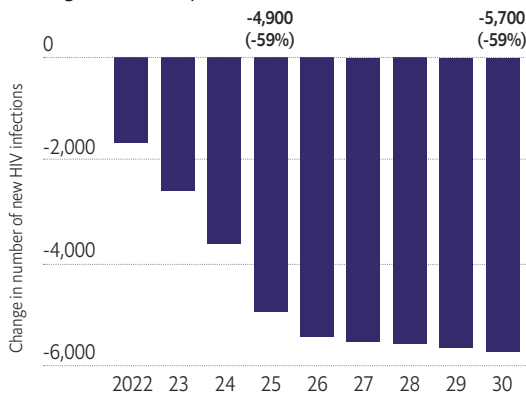
## Botswana

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 83% of the 100% required funding (funding gap = 17%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

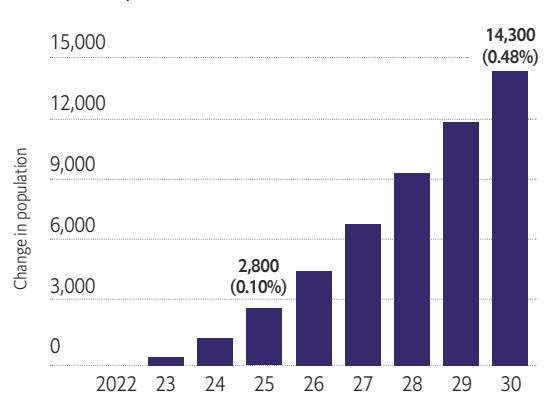


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 40,700
- Total AIDS-related deaths averted (2022-30): 11,300

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

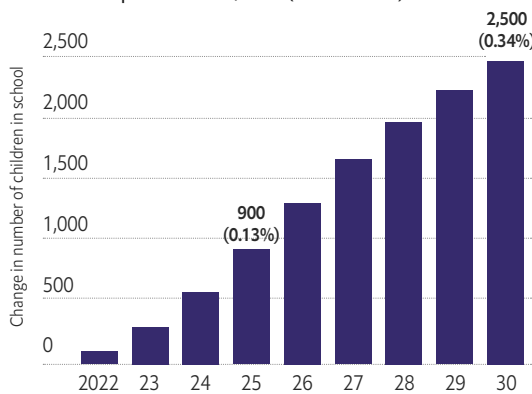


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 14,300 (+0.5%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

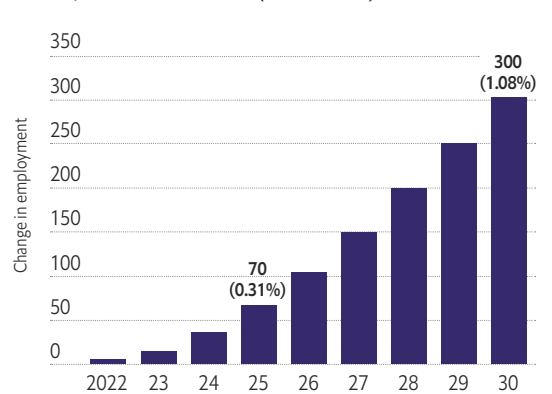


Source: Economist Impact analysis

- Difference in school enrolment (2030): 2,500 (0.3%)
- Difference in the number of orphaned children (2030): -26,700 (-25%)

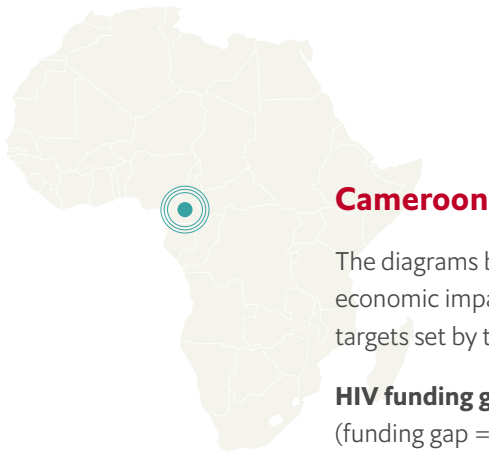
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 8,300 (+0.9%)
- Difference in GDP (2030): US\$300 million (+1.1%)



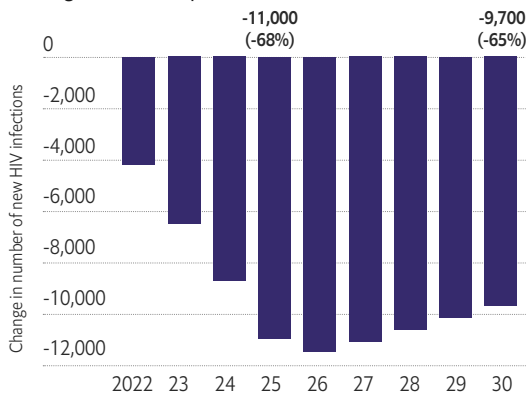
## Cameroon

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 9% of the 100% required funding (funding gap = 91%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

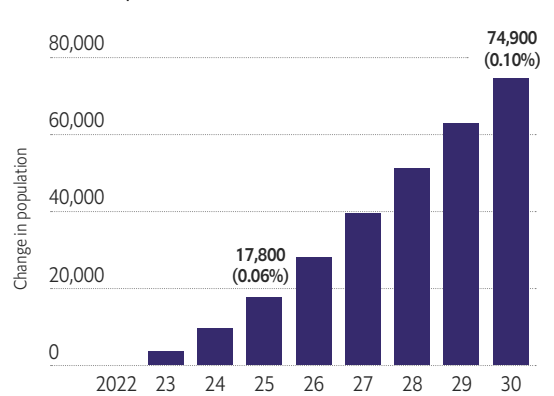


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 83,600
- Total AIDS-related deaths averted (2022-30): 57,500

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

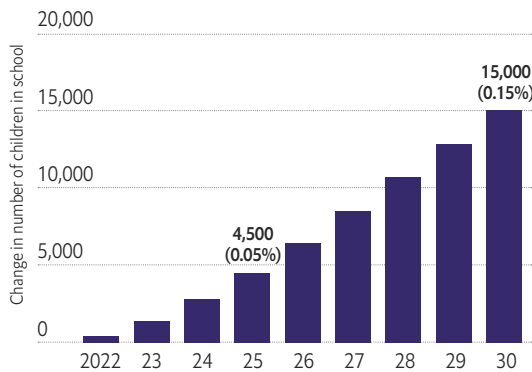


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 74,900 (+0.22%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

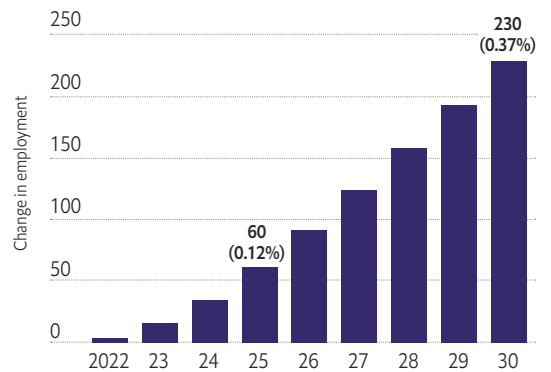


Source: Economist Impact analysis

- Difference in school enrolment (2030): 15,000 (0.15%)
- Difference in the number of orphaned children (2030): -93,000 (-6.3%)

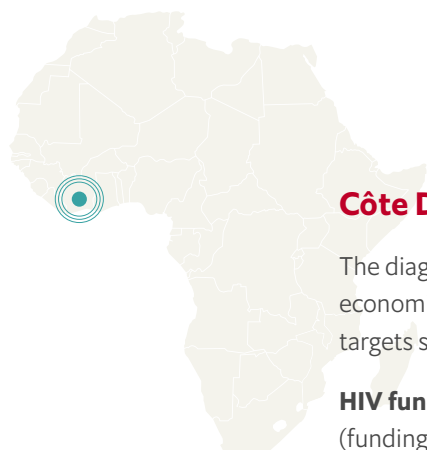
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 47,900 (+0.33%)
- Difference in GDP (2030): US\$230 million (0.37%)



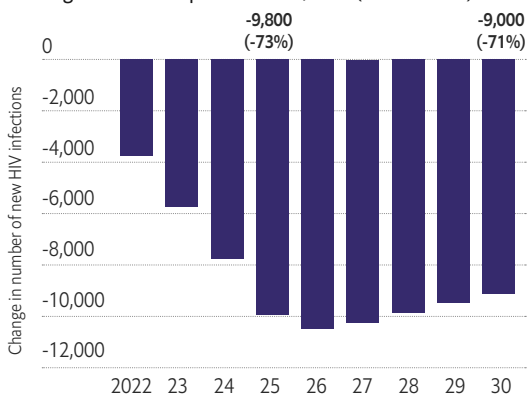
## Côte D'Ivoire

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 69% of the 100% required funding (funding gap = 31%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

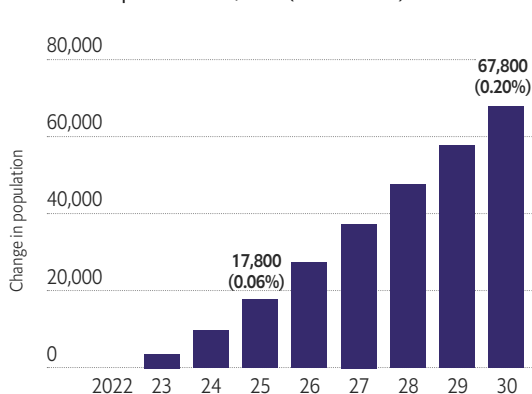


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 75,600
- Total AIDS-related deaths averted (2022-30): 51,800

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

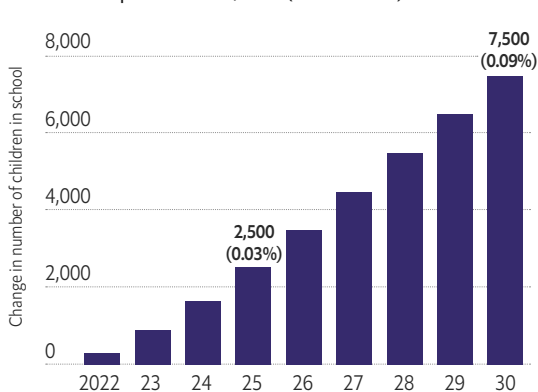


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 67,800 (+0.20%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

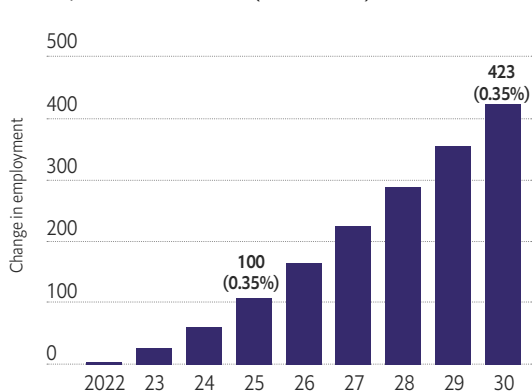


Source: Economist Impact analysis

- Difference in school enrolment (2030): 7,500 (0.09%)
- Difference in the number of orphaned children (2030): -67,600 (-4.0%)

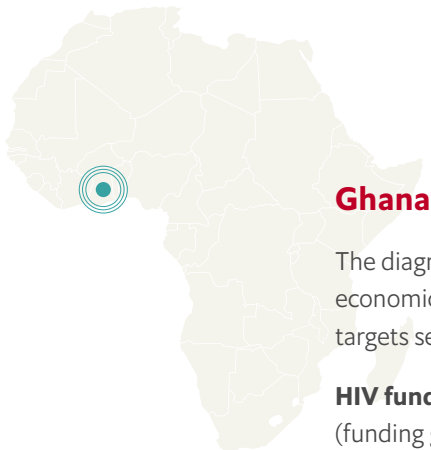
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 35,200 (+0.33%)
- Difference in GDP (2030): US\$423 million (+0.35%)



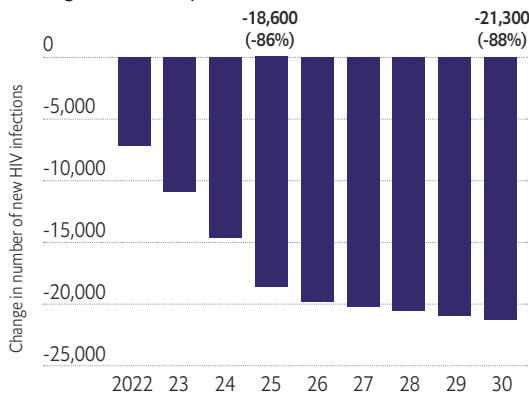
## Ghana

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 53% of the 100% required funding (funding gap = **47%**).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

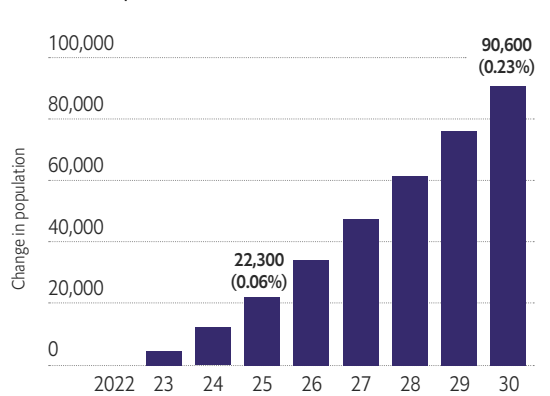


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 153,900
- Total AIDS-related deaths averted (2022-30): 46,300

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

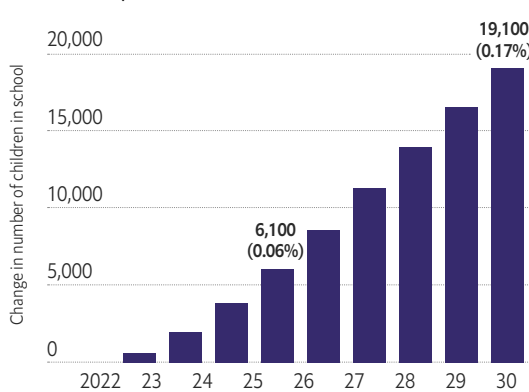


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 90,600 (+0.23%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

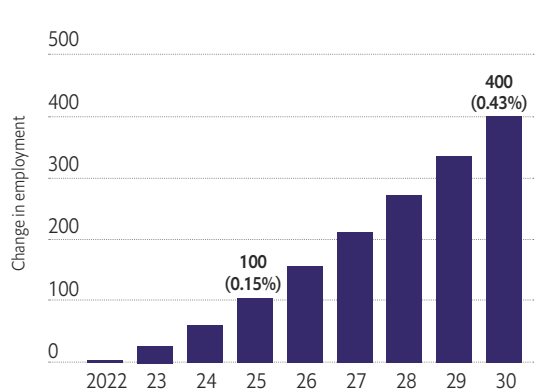


Source: Economist Impact analysis

- Difference in school enrolment (2030): 19,100 (0.17%)
- Difference in the number of orphaned children (2030): -112,900 (-9.1%)

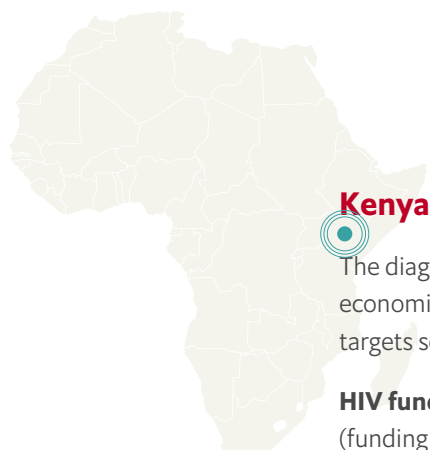
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 60,700 (+0.37%)
- Difference in GDP (2030): US\$400 million (+0.43%)



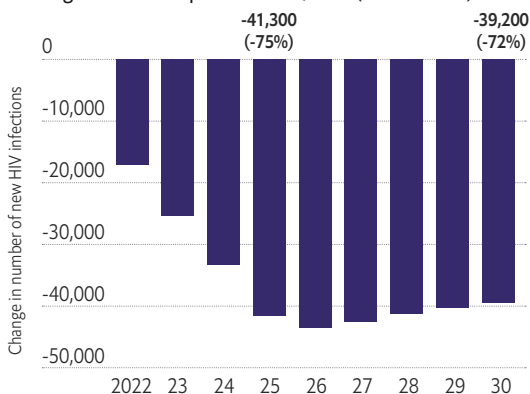
**Kenya**

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 72% of the 100% required funding (funding gap = 28%).

**Health impacts**

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

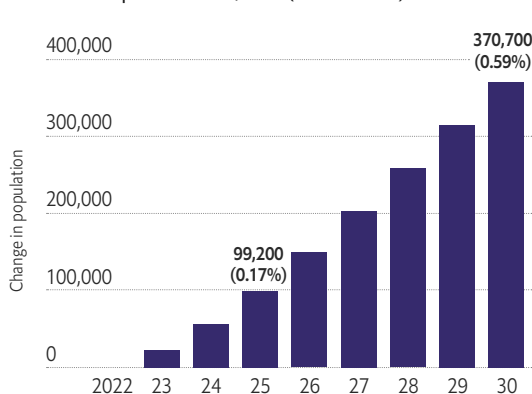


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 322,500
- Total AIDS-related deaths averted (2022-30): 404,700

**Demographic impacts**

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

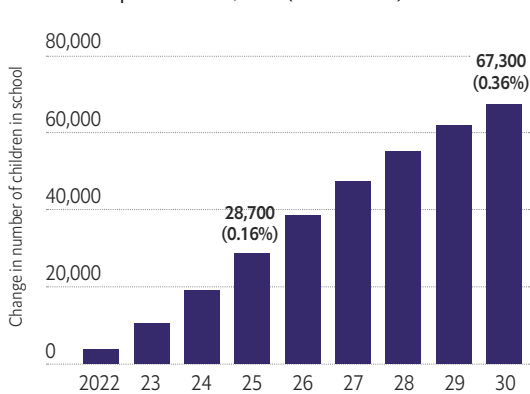


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 370,700 (+0.59%)

**Social impacts**

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

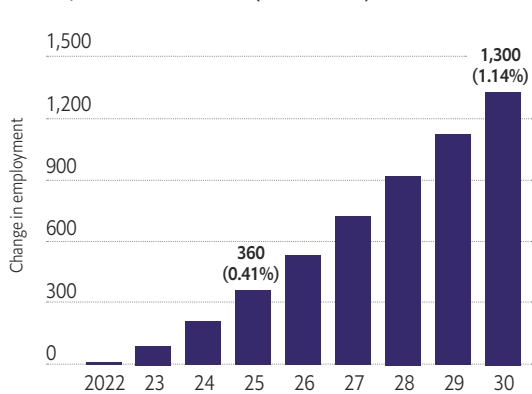


Source: Economist Impact analysis

- Difference in school enrolment (2030): 67,300 (0.36%)
- Difference in the number of orphaned children (2030): -492,400 (-19.7%)

**Economic impacts**

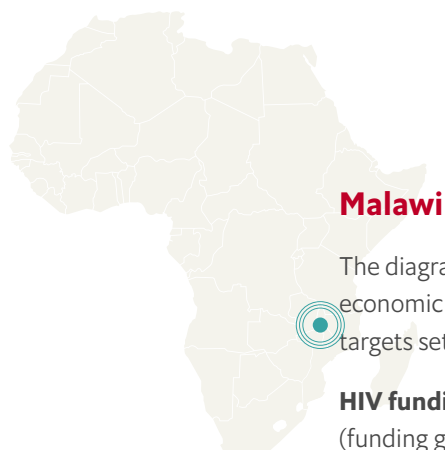
Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 324,00 (+1.02%)
- Difference in GDP (2030): US\$1,300 million (+1.14%)





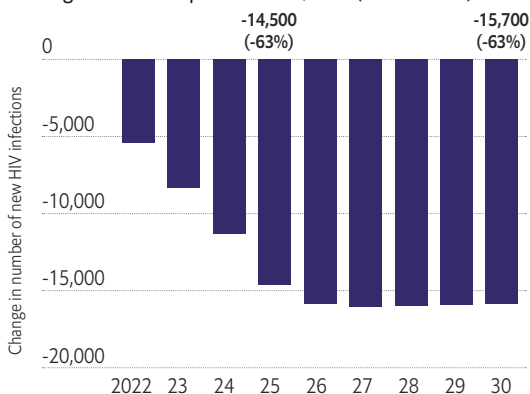
## Malawi

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 56% of the 100% required funding (funding gap = **44%**).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

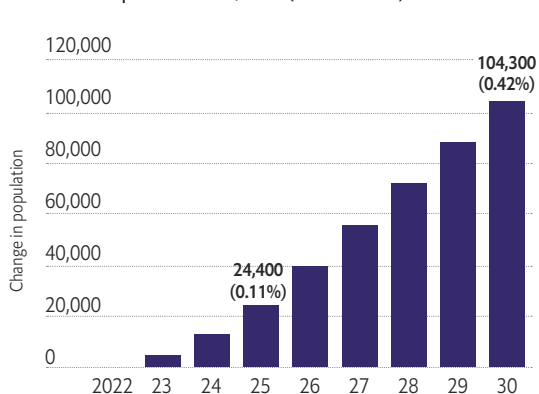


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 118,600
- Total AIDS-related deaths averted (2022-30): 79,900

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

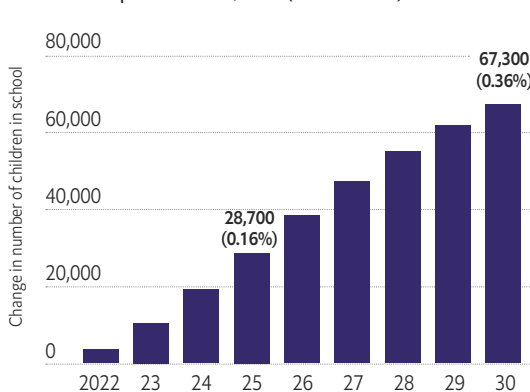


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 104,300 (+0.42%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

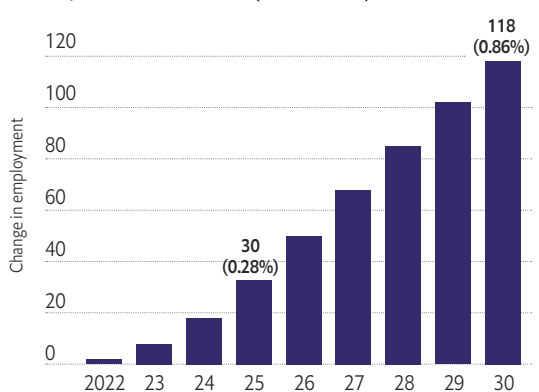


Source: Economist Impact analysis

- Difference in school enrolment (2030): 22,800 (0.28%)
- Difference in the number of orphaned children (2030): -184,504 (-16.3%)

### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 77,000 (+0.72%)
- Difference in GDP (2030): US\$118 million (+0.86%)



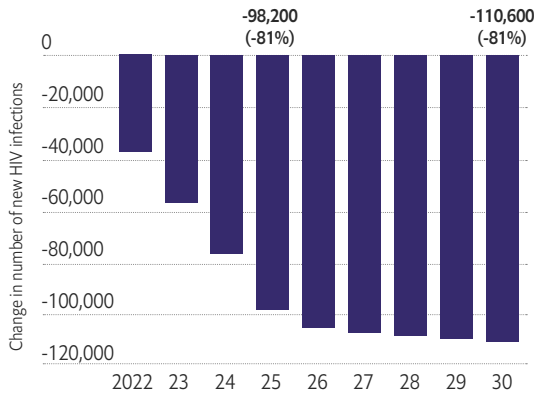
## Mozambique

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 59% of the 100% required funding (funding gap = 41%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

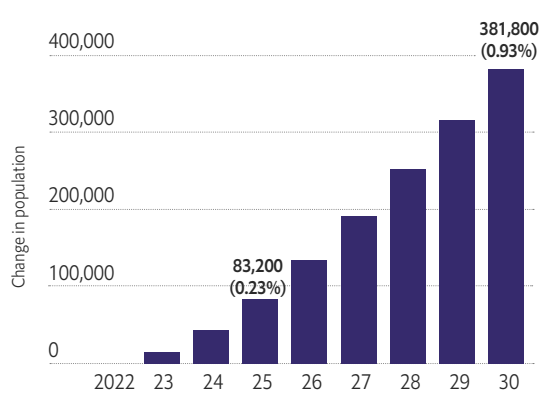


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 809,900
- Total AIDS-related deaths averted (2022-30): 44,000

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

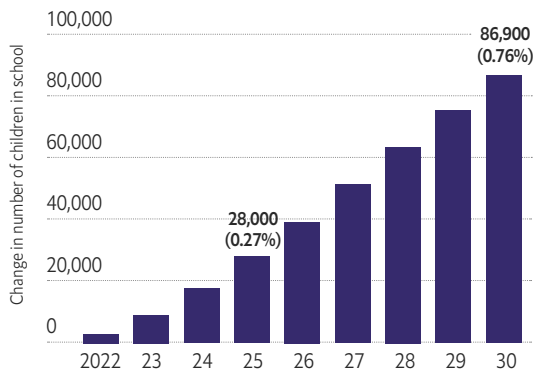


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 381,800 (+0.93%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

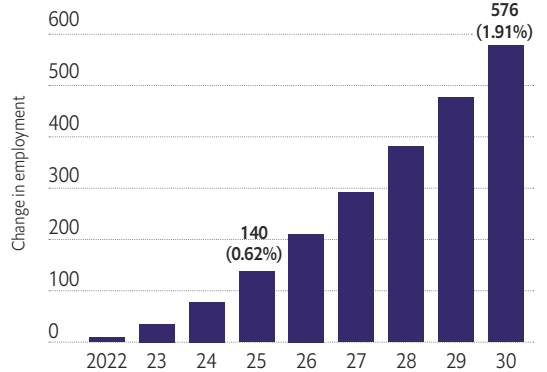


Source: Economist Impact analysis

- Difference in school enrolment (2030): 86,900 (0.76%)
- Difference in the number of orphaned children (2030): -722,200 (-29.0%)

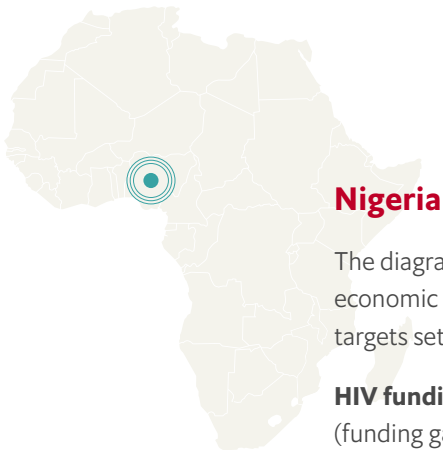
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 287,500 (+1.55%)
- Difference in GDP (2030): US\$576 million (+1.91%)



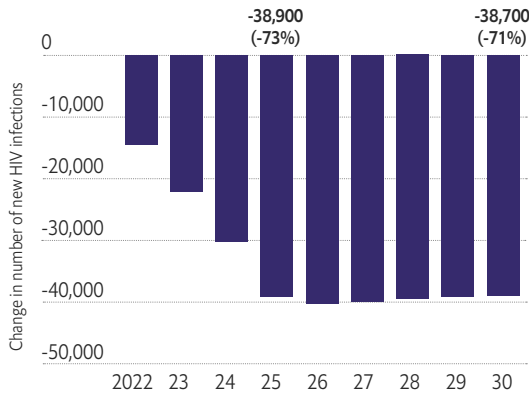
## Nigeria

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 65% of the 100% required funding (funding gap = 35%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

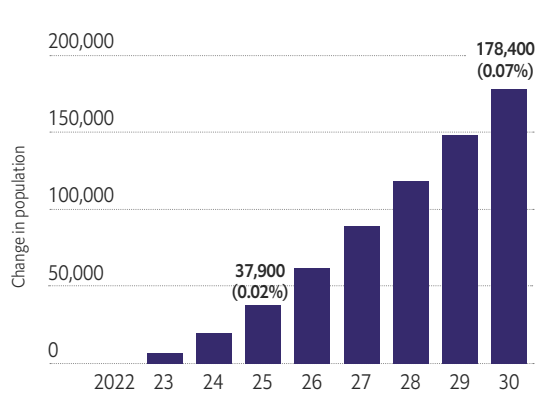


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 302,200
- Total AIDS-related deaths averted (2022-30): 138,700

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

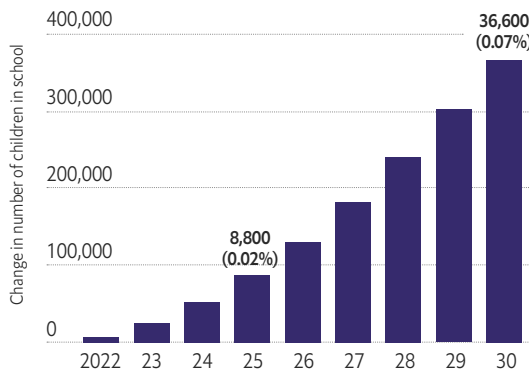


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 178,400 (+0.07%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

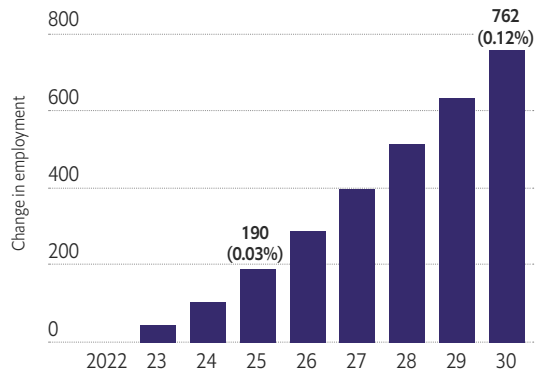


Source: Economist Impact analysis

- Difference in school enrolment (2030): 36,600 (0.07%)
- Difference in the number of orphaned children (2030): -304,600 (-2.29%)

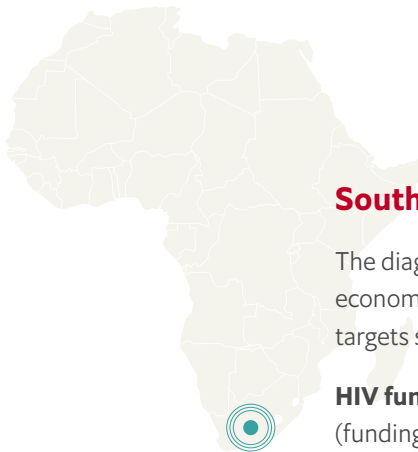
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 80,800 (+0.10%)
- Difference in GDP (2030): US\$762 million (+0.12%)



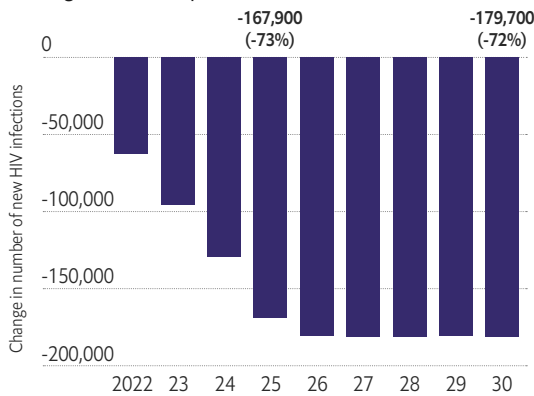
### South Africa

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 66% of the 100% required funding (funding gap = 34%).

#### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

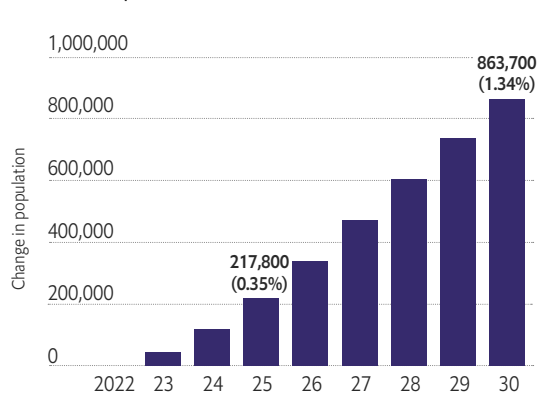


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 1,353,000
- Total AIDS-related deaths averted (2022-30): 661,400

#### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

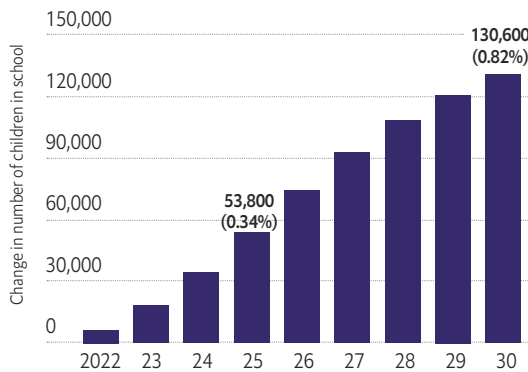


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 863,700 (+1.34%)

#### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

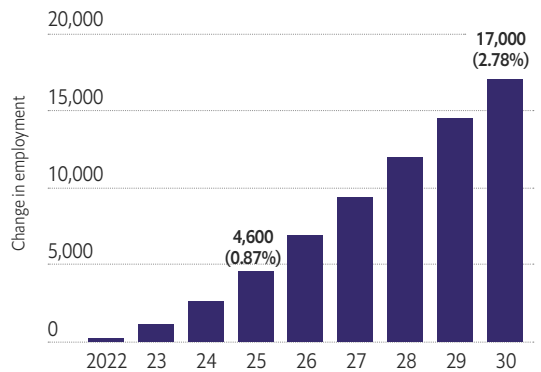


Source: Economist Impact analysis

- Difference in school enrolment (2030): 130,600 (0.82%)
- Difference in the number of orphaned children (2030): -1,039,300 (-26.4%)

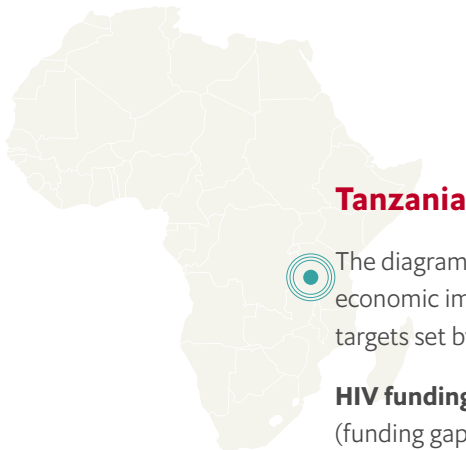
#### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 455,083 (+2.44%)
- Difference in GDP (2030): US\$17,050 million (+2.78%)



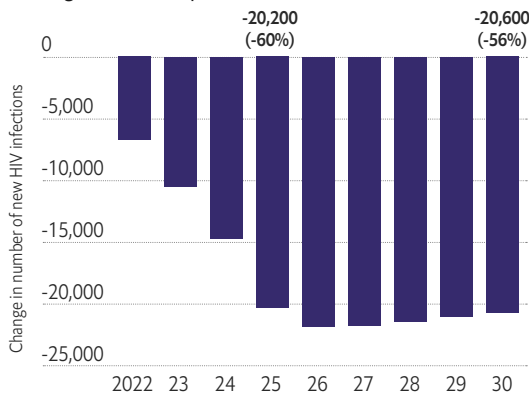
## Tanzania

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 68% of the 100% required funding (funding gap = 32%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

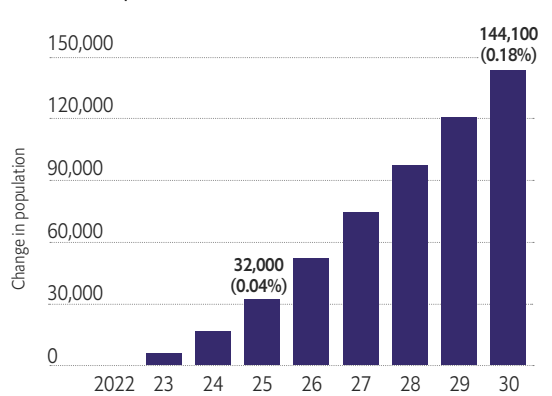


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 158,173
- Total AIDS-related deaths averted (2022-30): 111,704

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

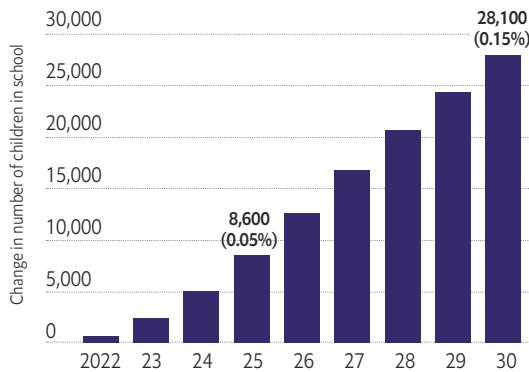


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 144,100 (+0.18%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

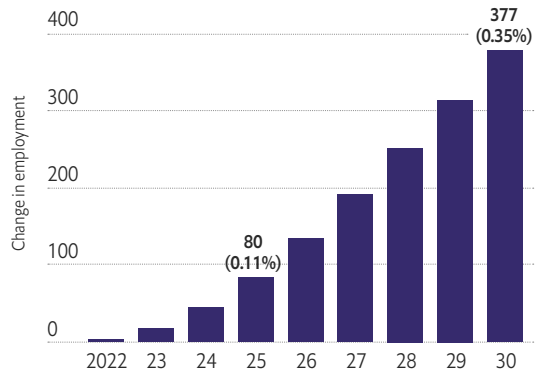


Source: Economist Impact analysis

- Difference in school enrolment (2030): 28,100 (0.15%)
- Difference in the number of orphaned children (2030): -307,200 (-10.9%)

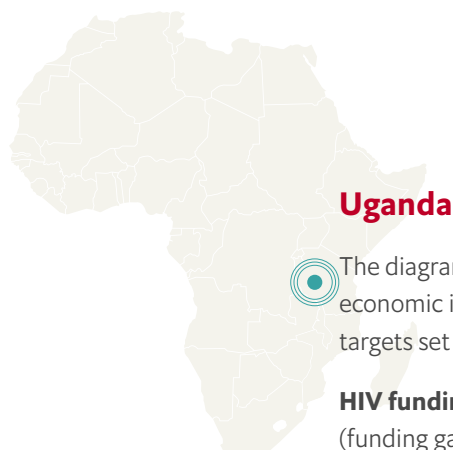
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 110,700 (+0.29%)
- Difference in GDP (2030): US\$377 million (+0.35%)



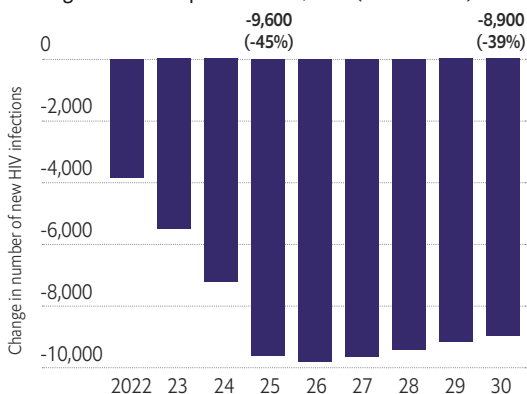
## Uganda

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 77% of the 100% required funding (funding gap = 23%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

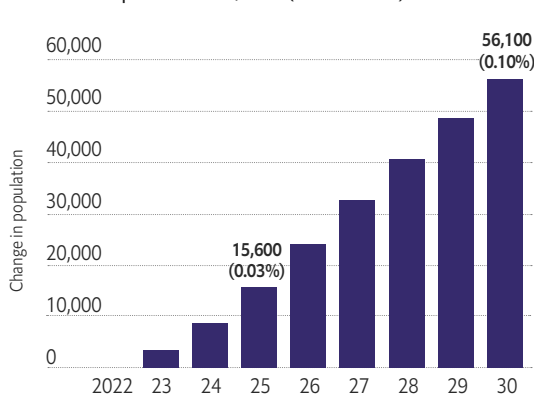


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 72,800
- Total AIDS-related deaths averted (2022-30): 41,500

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

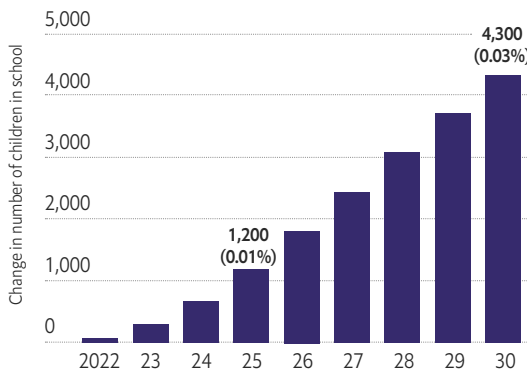


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 56,100 (+0.10%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

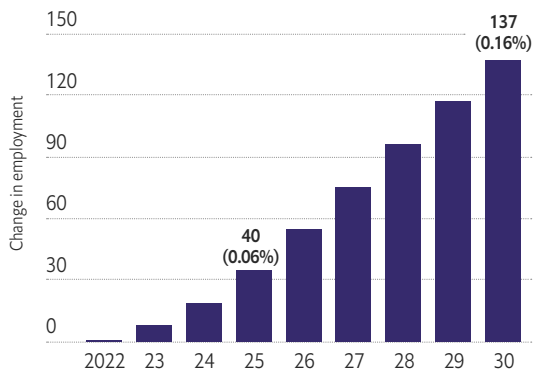


Source: Economist Impact analysis

- Difference in school enrolment (2030): 4,300 (0.03%)
- Difference in the number of orphaned children (2030): -18,100 (-0.8%)

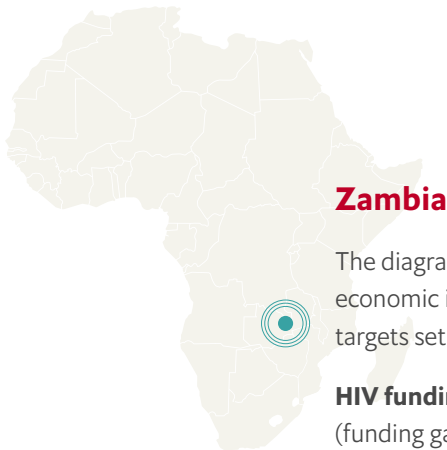
### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 34,600 (+0.16%)
- Difference in GDP (2030): US\$137 million (+0.16%)



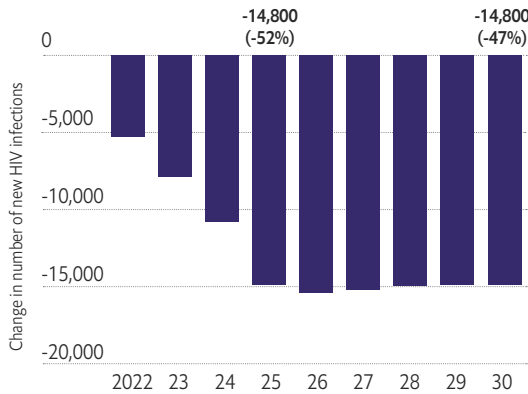
## Zambia

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 72% of the 100% required funding (funding gap = 28%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

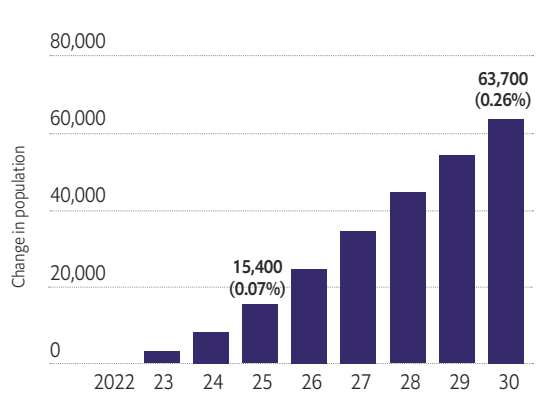


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 113,500
- Total AIDS-related deaths averted (2022-30): 48,500

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

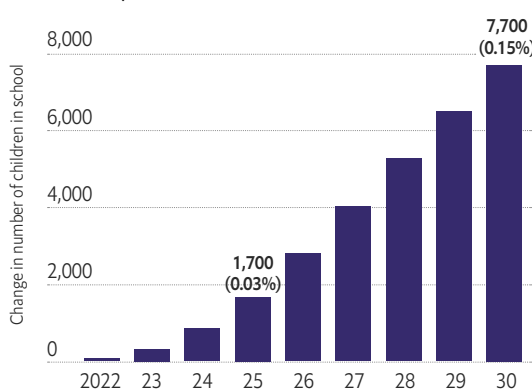


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 63,700 (+0.26%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

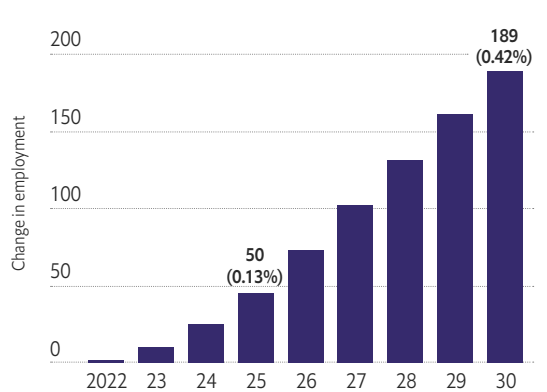


Source: Economist Impact analysis

- Difference in school enrolment (2030): 7,700 (0.15%)
- Difference in the number of orphaned children (2030): -37,000 (-3.8%)

### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 33,500 (+0.38%)
- Difference in GDP (2030): US\$189 million (+0.42%)



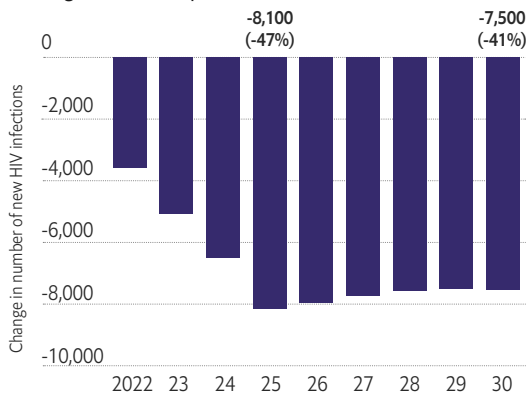
## Zimbabwe

The diagrams below summarise overall findings comparing the health, demographic, social and economic impacts estimated to arise from a fully funded HIV response in Botswana to meet the targets set by the Political Declaration, relative to business-as usual (BAU).

**HIV funding gap:** Funding levels under the BAU scenario covers 65% of the 100% required funding (funding gap = 35%).

### Health impacts

Difference in new annual HIV infections under the 100% funding scenario compared to BAU, total (% difference)

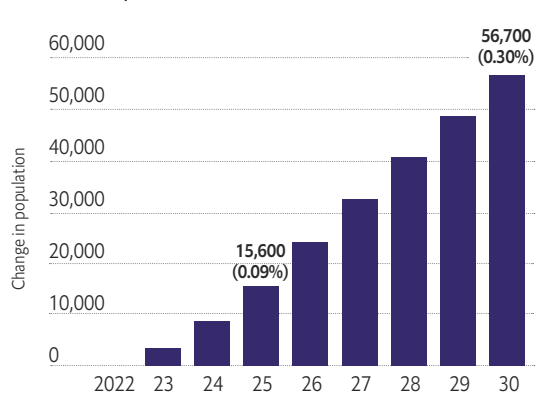


Source: Avenir Health; Economist Impact analysis

- Total HIV cases averted (2022-30): 61,200
- Total AIDS-related deaths averted (2022-30): 43,000

### Demographic impacts

Difference in population size under the 100% funding scenario compared to BAU, total (% difference)

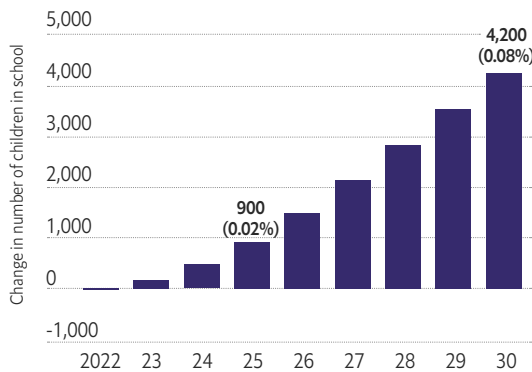


Source: Economist Impact analysis

- Difference in population size under 100% funding relative to BAU (2030): 56,700 (+0.30%)

### Social impacts

Difference in total school enrolment under the 100% funding scenario compared to BAU, total (% difference)

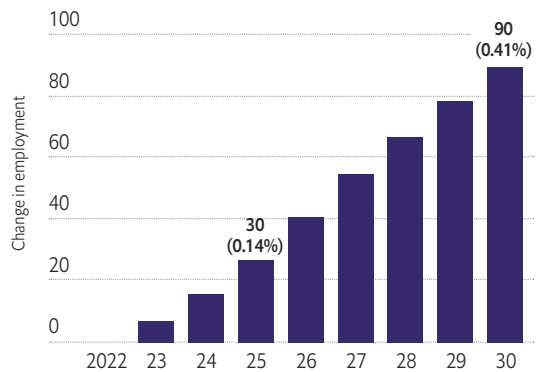


Source: Economist Impact analysis

- Difference in school enrolment (2030): 4,200 (0.08%)
- Difference in the number of orphaned children (2030): 3,500 (0.4%)

### Economic impacts

Difference in GDP under the 100% funding scenario compared to BAU, total in US\$ millions (% difference)



Source: Economist Impact analysis

- Difference in total employment (2030): 35,700 (+0.40%)
- Difference in GDP (2030): US\$90 million (+0.41%)



# Appendix III.

## Modelling methods

### Model overview

In this report, Economist Impact assesses the social and economic impact of mobilising financial resources towards the HIV response. A custom bottom-up excel-based scenario model has been designed and used to estimate the impacts, comparing a business-as-usual scenario to an alternative scenario in which 100% of the funding targets outlined in the 2021 Political Declaration on HIV and AIDS are met.<sup>211</sup> This section provides an overview of the methodology used for the quantitative analysis.

Economist Impact has developed country-specific models for a selection of 13 countries in Sub-Saharan Africa. The selection of countries has been informed based on specific criteria, including:

- Inclusion of the country within the Global HIV Prevention Coalition
- HIV incidence
- Data availability

Combined, the selected countries accounted for 47% of all new global HIV infections in 2021.

**Table A2.1. New HIV infections by country (2021)**

| Countries   | New HIV infections (2021) | % of global new HIV infections (2021) |
|---|---------------------------|---------------------------------------|
| South Africa                                      | 210,000                   | 14.0%                                 |
| Mozambique  | 150,000 <sup>k</sup>      | 10%                                   |
| Nigeria   | 74,000                    | 4.9%                                  |
| Tanzania  | 54,000                    | 3.6%                                  |
| Uganda  | 54,000                    | 3.6%                                  |
| Zambia  | 38,000                    | 2.5%                                  |
| Kenya   | 35,000                    | 2.3%                                  |
| Zimbabwe  | 23,000                    | 1.5%                                  |
| Malawi  | 20,000                    | 1.3%                                  |
| Ghana   | 17,000                    | 1.1%                                  |
| Cameroon  | 15,000                    | 1.0%                                  |
| Botswana  | 7,200                     | 0.5%                                  |
| Côte d'Ivoire                                     | 5,500                     | 0.4%                                  |
| <b>Total new infections - Modelled countries</b>  | <b>702,700</b>            | <b>46.8%</b>                          |
| <b>Global number of new HIV infections (2021)</b> | <b>1,500,000</b>          |                                       |

Source: UNAIDS<sup>212</sup>

<sup>k</sup> Note: Estimates for Mozambique were not published for 2021. The figures included are estimated based on expert guidance.

At a high level, the model uses as an input the direct impact of changes in funding levels on number of AIDS-related deaths and the incidence of HIV across the population, from estimations provided by Avenir Health using the Goals model.<sup>213</sup> The estimated impact on these health-related outcomes are then used to assess the impact on economic outcomes through social impact channels including education and labour market changes. The model is structured into four key modules. The key linkages assessed, and assumptions made, for each are discussed in detail below.

- **Health impact module:** inputs estimations provided by Avenir Health to assess the impact of funding scenarios on health outcomes (key indicators include: HIV incidence; people living with HIV; AIDS-related deaths)
- **Demographic impact module:** quantifies the impact of changes in health outcomes on population by age cohort (key indicators include: births; deaths; population size and structure)
- **Social impact module:** assesses the impact of HIV status and treatment status on children and young people (key indicators include: school enrollment; orphan status)
- **Economic impact module:** estimates the impact of health, social and demographic changes on wider economic outcomes (key indicators include: employment; productivity (measured by output per worker); gross domestic product (GDP))

The key data sources used to inform the country-level analysis for each module are summarised below. All impacts are presented as in-year impacts relative to business-as-usual in the same year, and are therefore not discounted.

**Table A2.2. Model data sources**

| Module                    | Data (by country)  | Source                             |
|---------------------------|--|------------------------------------|
| Health impact module      | Number of HIV infections (by gender and age)                         | Avenir Health, Goals model         |
|                           | People living with HIV (by gender and age)                           | Avenir Health, Goals model         |
|                           | AIDS-related deaths (by gender and age)                              | Avenir Health, Goals model         |
|                           | Number of people on antiretroviral therapy (ART) (by gender and age) | Avenir Health, Goals model         |
|                           | Disability-adjusted life years (DALYs)                               | Avenir Health, Goals model         |
|                           | Quality-adjusted life years (QALYs)                                  | Avenir Health, Goals model         |
| Demographic impact module | Population (by gender and age)                                       | United Nations Population Division |
|                           | Deaths (by gender and age)   | United Nations Population Division |
|                           | Live births (by gender and age)                                      | United Nations Population Division |
|                           | Migration (by gender and age)  | United Nations Population Division |
|                           | Fertility - total and age-specific by age of mother                  | United Nations Population Division |

Table A2.2. Model data sources (cont.)

| Module                 | Data (by country)  | Source   |
|------------------------|--|--|
| Social impact module   | Orphans (by age of child)  | Avenir Health, Goals model                         |
|                        | School enrollment (by gender and stage of education - pre-primary; primary; secondary; tertiary) | UNESCO   |
| Economic impact module | Employment (by gender and age)   | International Labour Organisation                  |
|                        | Unemployment (by gender and age)   | International Labour Organisation                  |
|                        | Labour force (size and growth)   | Economist Intelligence Unit                        |
|                        | Real GDP   | Economist Intelligence Unit                        |
|                        | Real GDP per capita  | Economist Intelligence Unit                        |
|                        | Median household disposable income per annum   | Economist Intelligence Unit                        |
|                        | Out of pocket expenditure per prevalent case of HIV  | Institute for Health Metrics and Evaluation (IHME) |

## Modelling scenarios

The model assesses the socio-economic outcomes associated with different levels of funding for HIV under two core scenarios. These scenarios are agnostic towards the source of the funding (i.e. domestic funding vs. international funding), and instead model the implications of the total availability of funds under each scenario:

- **Scenario 0 - Business-as-usual:** This scenario, modelled by Avenir Health, assumes that HIV funding remains on its current course. Business-as-usual funding requirements are modelled by assuming that the coverage of all interventions<sup>1</sup> is kept constant. Therefore, changes in funding levels are influenced by population growth which determines the size of the population in need of each service.
- **Scenario 1 - 100% funding:** This scenario, modelled by Avenir Health, assumes that the full commitment outlined in the 2021 Political Declaration on HIV and AIDS is met.<sup>214</sup> The country-level resource needs are modelled by Avenir Health based on required service coverage and country-specific unit costs.

In addition to these core scenarios, Economist Impact explores a third potential funding scenario based on projections by the World Bank on the recovery of health financing post-covid-19.<sup>215</sup> The World Bank outlines three possible trajectories for health financing as economies recover from the impact of covid:

<sup>1</sup> For example: pre-exposure prophylaxis medication for AIDS prevention; antiretroviral therapy (ART) treatment for people living with HIV; condom distribution programmes; prevention of mother-to-child transmission (PMTCT) of HIV programmes; and others

- Contraction: Negative growth in per capita general government expenditure on health spending, remaining below pre-covid levels until 2027
- Stagnation: Positive but slowing growth in per capita health spending, remaining below pre-covid levels until 2027
- Expansion: Positive and increased growth in per capita health spending, increasing beyond pre-covid levels until 2027

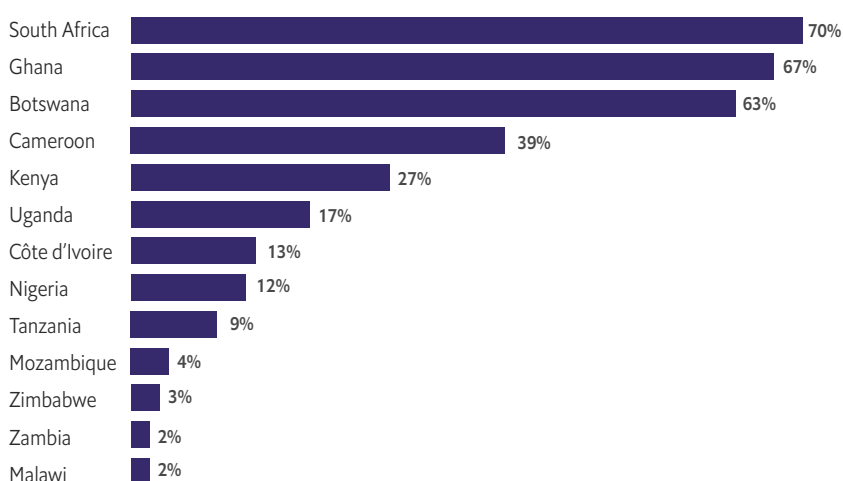
Economist Impact applies these assumptions on total health financing to domestic AIDS spending to develop an alternative **“covid-recovery” scenario (Scenario 2)** to the business-as-usual scenario discussed above. This scenario assumes that international funding levels remain at business-as-usual levels based on the estimated share of total funding provided by donors across each country (see Figure A2.1. below). Meanwhile, domestic funding levels are adjusted to reflect the assumptions proposed by the World Bank. In this scenario, the change in funding levels relative to the business-as-usual scenario is determined based on:

- World Bank assumptions, which determines the covid recovery in each country
- Impact of covid-19 on per capita funding levels
- Domestic share of total funding

The expected funding levels under the “covid-recovery” scenario are compared to the business-as-usual scenario to demonstrate the factors that could enable some recovery in spending across countries, but equally the shortfall vis-a-vis the 100% funding requirements.

**Figure A2.1. Domestic share of total funding on HIV (2019)**

% of total funding



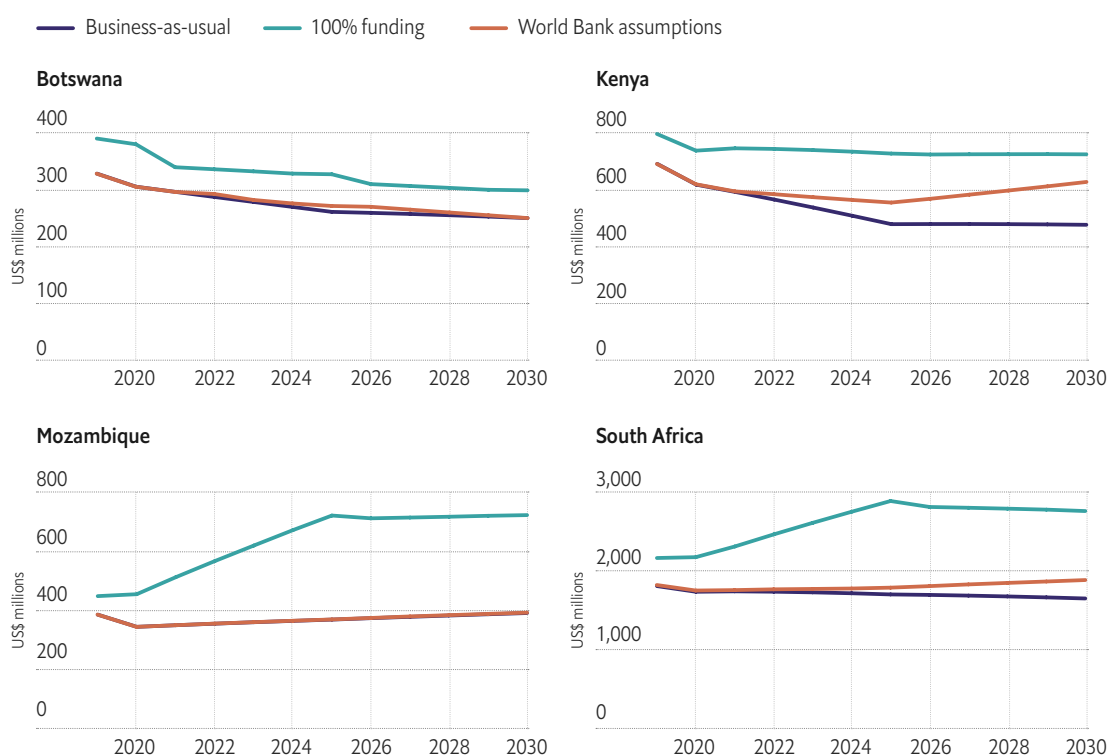
Source: UNAIDS HIV Financial Dashboard<sup>216</sup>

The assumptions on growth in funding levels applied for each country based on the World Bank assumptions, and the implications for total funding levels between 2022-30 are outlined in Table A2.3. below and illustrated for selected countries in Figure A2.2.

**Table A2.3. Assumptions on total funding (domestic and international) across each modelled scenario (US\$ millions)**

| Country       | Scenario 2 assumptions      |   | Total funding across scenarios (2022-30) |                           |  |
|---------------|-----------------------------|---|--|---------------------------|--|
|               | World Bank country grouping | Assumed annual growth in per capita domestic spending (2022-30) | Scenario 0 - Business-as-usual           | Scenario 1 - 100% funding | Scenario 2 - World Bank covid-recovery |
| Botswana      | Contraction                 | -4.30%  | 2,367                                    | 2,842                     | 2,420                                  |
| Cameroon      | Stagnation                  | 2%  | 1,111                                    | 1,713                     | 1,305                                  |
| Côte d'Ivoire | Expansion                   | 7%  | 1,358                                    | 2,106                     | 1,535                                  |
| Ghana         | Expansion                   | 5%  | 707                                      | 1,473                     | 981                                    |
| Kenya         | Stagnation                  | 3%  | 4,351                                    | 6,389                     | 5,125                                  |
| Malawi        | Stagnation                  | 3%  | 1,309                                    | 2,464                     | 1,311                                  |
| Mozambique    | Contraction                 | -6%   | 3,384                                    | 6,214                     | 3,391                                  |
| Nigeria       | Stagnation                  | 0.10%   | 5,719                                    | 9,116                     | 5,681                                  |
| South Africa  | Stagnation                  | 0.05%   | 15,224                                   | 24,710                    | 16,350                                 |
| Tanzania      | Expansion                   | 5.10%   | 4,827                                    | 7,606                     | 5,179                                  |
| Uganda        | Expansion                   | 8%  | 4,613                                    | 6,087                     | 5,927                                  |
| Zambia        | Contraction                 | -2%   | 2,917                                    | 4,217                     | 2,915                                  |
| Zimbabwe      | Expansion                   | 11.5%   | 2,167                                    | 3,459                     | 2,229                                  |

**Figure A2.2. Assumed funding levels across selected countries (2022-30)**



## Model and assumptions

This section outlines the methodology and assumptions for the analysis of each module within the overarching impact model.

### Module 1: Health impact module

The health impact module inputs data and estimations by Avenir Health for health outcomes associated with different levels of HIV funding including: number of HIV infections; number of people living with HIV; AIDS-related deaths; number of people on ART treatment; DALYs and QALYs.

The difference between outcomes in the business-as-usual scenario and the 100% funding scenario provide an estimate of the impact of increasing funding levels to meet the requirements set out in global commitments.

### Module 2: Demographic impact module

The second module uses the health impact inputs to estimate the resulting changes in the demographic structure of each country.

Baseline data is used to provide a value for population size and disaggregation across gender and age in the business-as-usual scenario. Changes in the estimated number of births and deaths in the 100% funding scenario relative to the business-as-usual scenario are then used to estimate overall changes in population size:

- **Changes in births:** The change in the number of births in the 100% funding scenario relative to the business-as-usual scenario is estimated based on changes in the number of deaths in women of child-bearing age (ages 10-59). Economist Impact assumes that the average country- and age-specific fertility rates remain the same across each scenario to estimate the impact of a change in the population size of this cohort on the number of babies born.

$$Births^t = \sum_{j,i} (CohortPop_{j,i}^t \times AgeSpecificFertility_{j,i}^t)$$

where:

- $Births^t$  is the total number of births in the year of analysis (from 2022 to 2030)
- $CohortPop_{j,i}^t$  is the size of the female population in country  $i$  and age cohort  $j$  at time  $t$
- $AgeSpecificFertility_{j,i}^t$  is the number of children born per woman in country  $i$  and age cohort  $j$  at time  $t$

- **Changes in deaths:** The change in the total number of deaths (all-cause mortality) is estimated based on changes in AIDS-related deaths obtained from Avenir Health, scaled to account for the impact of changes in AIDS-related deaths on all-cause deaths (see Table A2.4. for assumptions).
- **Changes in total population:** Based on changes in the number of births and deaths across the modelled scenarios, Economist Impact estimates changes in the population size across age and gender cohorts as follows:

For cohorts aged 0-4:

$$Pop^t = Pop^{t-1} - Deaths^{t-1} + Births^{t-1} - Change^{t-1}$$

For cohorts aged 5 and above:

$$Pop^t = Pop^{t-1} - Deaths^{t-1} - Change^{t-1} + Change^t + NetMigration^{t-1}$$

where:

- $Pop^t$  is the population of the cohort in the current period
- $Pop^{t-1}$  is the population of the cohort in the previous period (in the first period of the analysis, this is given by the baseline estimates)
- $Deaths^{t-1}$  is the number of deaths in the cohort in the previous period (estimated based on changes in AIDS-related deaths under each scenario)
- $Births^{t-1}$  is the number of births (estimated based on the change in births under each scenario)
- $NetMigration^{t-1}$  is the number of migrants across each cohort from the previous period (Note: it is assumed that the total number of migrants remains the same as in the baseline)
- $Change^{t-1}$  is the movement of individuals from the previous age cohort into the subsequent age cohort in the new period, for example the share of individuals in the 0-4 cohort that move into the 5-9 cohort in the following time period (Note: it is assumed that the share of movement across cohorts relative to the size of the cohort remains the same in the scenario analysis compared to as in the baseline)
- $Change^t$  is the movement of individuals from the current age cohort into the subsequent age cohort in the new period, for example the share of individuals in the 5-9 cohort that move into the 10-14 cohort in the following period (Note: it is assumed that the share of movement across cohorts relative to the size of the cohort remains the same in the scenario analysis compared to as in the baseline)

**Table A2.4. Demographic impacts module: Key assumptions**

| Indicator           | Assumption   | Source   |
|---------------------|--|--|
| All-cause mortality | The model assumes an AIDS-deaths multiplier of <b>1.47</b> . In other words, every 1 additional AIDS-related death adds 1.47 all-cause deaths. | Interviews with experts suggest that tuberculosis (TB) is the largest cause of death among people living with HIV. Research finds that TB accounts for 32% of deaths among people with HIV. <sup>217</sup> It is assumed that this accounts for all non-AIDS related deaths for people with HIV. The estimated multiplier is in line with studies focused on western Africa which find that for 63% of people hospitalised with HIV, the underlying cause of death was AIDS, while all other deaths were attributed to other factors. <sup>218</sup> |

### Module 3: Social impact module

The social impact module uses estimates from the health and demographic impact modules to estimate selected outcomes for children and young people arising under each funding scenario.

- **Changes in orphans:** The change in the number of orphans in the 100% funding scenario relative to the business-as-usual scenario is estimated by Avenir Health using the Goals model.
- **Changes in school enrollment:** The change in the number of children enrolled in school is estimated based on a range of factors (see assumptions listed in A2.5.) including:
  - Population changes: Changes in the size of the population of school-age children
  - Enrollment rate changes: Changes in the enrollment rates of children based on changes in their health status (including the number of HIV positive children, and the number of children on ART treatment) and their orphan status

$$Enrollment^t = \sum_{j,i}^t (NonHIV_{ji}^t \times EnrolRate_{j,i,s}^t) + \sum_{j,i}^t (HIVNoART_{ji}^t \times EnrolRate_{j,i,s}^t) + \sum_{j,i}^t (HIVART_{ji}^t \times EnrolRate_{j,i,s}^t)$$

where:

- $Enrollment^t$  is the total number of children enrolled in school in each year t (from 2022 to 2030)
- $NonHIV_{ji}^t$  is the size of the HIV negative child population in country  $i$  and education level  $j$  at time  $t^m$
- $HIVNoART_{ji}^t$  is the size of the HIV positive (not on ART) child population in country  $i$  and education level  $j$  at time  $t$
- $HIVART_{ji}^t$  is the size of the HIV positive (on ART) child population in country  $i$  and education level  $j$  at time  $t$
- $EnrolRate_{j,i,s}^t$  is the number of children enrolled in school relative to the size of the child population in country  $i$ , education level  $j$ , and health status  $s$  at time  $t^n$

**Table A2.5. Social impacts module: Key assumptions**

| Indicator  | Assumption  | Source  |
|--|---|---|
| School enrollment rate - HIV positive not on treatment | The model assumes a <b>98%</b> enrollment rate for children who are HIV positive and not on ART relative to HIV negative children (i.e. for every 100 HIV negative children in school, 98 HIV positive children not on ART are in school) | Literature suggests that there is no significant impact on education enrollment for HIV positive and negative children. Based on interviews with experts, a small adjustment is made for children not on ART to account for some interruption to education. |

<sup>m</sup> The model accounts for baseline differences in enrolment across different stages of education including: Pre-primary (ages 3-4); Primary (ages 5-11); Secondary (ages 12-18); Tertiary (ages 19+)

<sup>n</sup> The model differentiates across three different health statuses: HIV negative; HIV positive not on ART; HIV positive on ART



**Table A2.5. Social impacts module: Key assumptions (cont.)**

| Indicator  | Assumption  | Source   |
|--|---|--|
| School enrollment rate - HIV positive on treatment | The model assumes a <b>100%</b> enrollment rate for children who are HIV positive and on ART relative to HIV negative children                          | Literature suggests that there is no significant difference in education enrollment for HIV positive and negative children, particularly when HIV positive children receive ART treatment. These findings are confirmed by interviews with experts.  |
| School enrollment rate - orphaned children         | The model assumes a <b>13%</b> enrollment rate for children who are orphaned relative to non-orphaned children  | A meta-study conducted by Yan Guo <sup>219</sup> surfaces education outcomes by orphan status. The research concluded a wide range of impact of orphan status on enrollment rates, from no impact to an impact of up to 35%. One study of 40 countries in Sub-Saharan Africa reveals that orphans are approximately 13% less likely to be enrolled in school than non-orphans. This estimate has been validated through interviews with experts. |
| Impact of school enrollment on contracting HIV     | The model assumes that HIV prevalence in girls aged 15-19 enrolled in school is <b>0.37</b> times the prevalence of girls of the same age not in school | A 2018 study <sup>220</sup> from nine eastern and southern African countries found that school enrollment for girls was associated with a reduced odds of being HIV positive.  |

#### Module 4: Economic impact module

The economic impact analysis draws on estimates from the health, demographic and social impact modules and uses a modified Solow model framework to estimate the impacts on GDP associated with changes in funding levels.

Drawing on the work of Bloom et al (2017),<sup>221</sup> we assume the following production function for aggregate output at a country level:

$$Y_t^c = A_t^c K_t^c (\sum_{a=15}^{65} h_{t,a} l_{t,a} N_{t,a})^{1-\alpha}$$

where:

- $Y_t$  is GDP in the country of reference in year  $t$
- $A_t$  is a measure of technological productivity
- $K_t^c$  is physical capital
- $h_{t,a}$  is the average human capital of cohort  $a$
- $l_{t,a}$  is the number of units of labour supplied by cohort  $a$  (employment rate in cohort  $a$ )
- $N_{t,a}$  is number of individuals belonging to age group  $a$
- $\alpha$  is the elasticity of final output with respect to physical capital, or the capital share of total output

Using this framework, Economist Impact measures changes in GDP based on:

- **Physical capital accumulation** ( $K_t^\alpha$ ): For the purposes of this analysis, we assume that physical capital accumulation across each economy remains constant between the different scenarios modelling. In other words, any changes in funding for HIV is drawn away from other uses, therefore total government spending levels remain the same. This assumption also implies that the fiscal multiplier—or the economic return on every \$1 of government spending—remains unchanged regardless of the use of funding across competing priorities.
- **Effective labour supply** ( $l_{t,a} N_{t,a}$  - a measure of the number of employed people based on the size of the population and employment rates): We measure changes in the effective labour supply based on changes in the demographic structure of the economy which impacts the size of the working age population, and changes in employment rates driven by changes in the incidence of HIV. Changes in the effective supply of labour are estimated using a similar approach to that discussed above in relation to estimations of changes in school enrollment rates:

$$Employment^t = \sum_{j,i}^t (NonHIV_{j,i}^t \times EmpRate_{j,i,s}^t) + \sum_{j,i}^t (HIVNoART_{j,i}^t \times EmpRate_{j,i,s}^t) + \sum_{j,i}^t (HIVART_{j,i}^t \times EnrolRate_{j,i,s}^t)$$

where:

- $Employment^t$  is the total number of employed in the labour force in each year t (from 2022 to 2030)
- $NonHIV_{j,i}^t$  is the size of the HIV negative working age population in country  $i$  and age cohort  $j$  at time  $t$
- $HIVNoART_{j,i}^t$  is the size of the HIV positive (not on ART) working age population in country  $i$  and age cohort  $j$  at time  $t$
- $HIVART_{j,i}^t$  is the size of the HIV positive (on ART) working age population in country  $i$  and age cohort  $j$  at time  $t$
- $EmpRate_{j,i,s}^t$  is the number of working age people employed relative to the size of the working age population in country  $i$ , age cohort  $j$ , and health status  $s$  at time  $t$ <sup>9</sup>
- **Average human capital** ( $h_{t,a}$ ): This is a measure of labour productivity or output per worker, and is impacted by factors such as the education-related impacts of HIV, and worker capacity. In the baseline, we estimate output per worker across different gender and age cohorts using data on country-specific average salaries by gender and age as a proxy for labour productivity. Changes in average productivity levels under the 100% funding scenario relative to the business-as-usual scenario are estimated based on:

<sup>9</sup> The model differentiates across three different health statuses: HIV negative; HIV positive not on ART; HIV positive on ART

- Changes in productivity driven by changes in education levels (measured by changes the school enrollment rate of cohorts entering the labour force, estimated in the social impact module)
- Changes in productivity driven by changes in health and treatment status (i.e. HIV incidence and ART treatment rates)

The estimated changes in labour supply and average human capital combined are used to estimate GDP changes using the modified Solow framework discussed above.

**Table A2.6. Economic impacts module: Key assumptions**

| Indicator   | Assumption  | Source  |
|---|---|---|
| Employment rate - HIV positive not on treatment             | The model assumes a <b>98%</b> employment rate for the working age population that is HIV positive and not on ART relative to the HIV negative population (i.e. for every 100 HIV negative person employed, 98 HIV positive people not on ART are employed)   | Literature suggests that there is no significant impact on employment rates for HIV positive and negative individuals. Based on interviews with experts, a small adjustment is made for individuals not on ART to account for some interruption to work.  |
| Employment rate - HIV positive on treatment                 | The model assumes a <b>100%</b> employment rate for the working age population that is HIV positive and on ART relative to HIV negative population  | Literature suggests that there is no significant difference in employment rates for HIV positive and negative individuals of work age, particularly when HIV positive individuals receive ART treatment. These findings are confirmed by interviews with experts.   |
| Hours of work lost per year - HIV positive not on treatment | In addition to changes in employment on the extensive margin (the number of people employed) the model also captures changes on the intensive margin (the intensity of work, measured based on hours worked). The model assumes between <b>0.96-19.52</b> hours lost for individuals who are HIV positive and not on treatment. | The estimates are based on a study <sup>222</sup> from Zambia and South Africa which found that HIV positive individuals lost more productive days to illness than HIV negative individuals in both countries. Countries in the analysis are proxied with Zambia or South Africa based on HIV incidence rates to select the most appropriate parameters from the study as assumptions to the modelling. |
| Hours of work lost per year - HIV positive on treatment     | The model assumes between <b>39.68-44.8</b> working hours lost for individuals who are HIV positive and on treatment.   |   |
| Impact of school enrollment on productivity                 | The model assumes that a 1% change in school enrollment rates increase productivity levels by <b>0.35%</b> .  | A 2003 study <sup>223</sup> finds that a 1% increase in enrollment rates raises GDP per capita by 0.35%.  |

## Model limitations and areas for further research

As is the case with any modelling exercise which offers a simplification of reality, it is important to note the limitations of this study. The models combined data from multiple sources to offer novel estimates of the potential impacts of changes in HIV funding on health, social and economic outcomes. By using a bottom-up approach, they capture a number of inter-generational dynamics between cohorts of different ages, accounting for in-year changes in the size of each cohort and changes in the overall size of the working age population which contributes economically. Furthermore, the model also accounts for differences in the economic contribution of different age cohorts in the labour force. However, the analysis is based on several simplifying assumptions which form important limitations and caveats to the findings.

Firstly, there was a lack of robust, cross-country evidence in the literature to inform the model parameters. For example, there is limited available research which explores the relationships between HIV and treatment status, school enrollment, employment rates and productivity levels. As a result, this study has used expert opinion, supported with existing research in specific countries where available, for many of the parameters and assumptions which drive the results. Given the uncertainties around the parameters, the model uses conservative assumptions hence the findings are likely to be underestimated. Future research could explore more micro-level analysis to better understand the linkages and relationships between health, social and economic outcomes, building on the macro-level analysis conducted in this study.

Furthermore, while Economist Impact has used country-specific data to account for the unique context of each country modelled, given the data limitations discussed above, the same core assumptions have been used across all countries. In reality, the relationships between interrelated outcomes are likely to depend on the specific social and economic constructs within each country.

In addition to the limitations with regards to the parameters used in the analysis, the social and economic analysis also makes a number of simplifying assumptions which could be expanded and explored in greater depth in subsequent research. For example:

- **Education impacts:** The analysis explores the impacts of changes in HIV status for children on educational outcomes through the lens of school enrollment. In reality, changes in HIV status is likely to have an impact not only in terms of the number of children enrolled in education, but also on the intensity of their participation and engagement in education. In other words, there is a difference between the quantity of learning and the quality of learning, the latter of which is not fully captured by the models, or even understood in current academic discourse. Future research could dive deeper into exploring the implications of investment in HIV on the quality-adjusted learning outcomes for children.
- **Population growth impacts:** The analysis conducted in this study assesses the economic impact of changes in HIV investments through changes in population size which impacts on the productive economy through the labour force. This assumes a one-dimensional relationship between population growth and economic growth. There is a school of thought in the economic literature, however, that argues that population growth can also create a drain on economic

growth. For example, negative environmental impacts from a larger population could put downward pressure on the overall economic gains from population growth despite the positive impacts through labour market effects.

- **Economic impacts:** While adjustments have been made to account for differences in productivity levels across different age groups and genders, the economic analysis assumes that every additional person in the workforce within a certain age bracket contributes equivalently to economic output. This relies on a number of underlying assumptions, including that the labour force is able to absorb the additional labour (in other words, that there is sufficient growth in labour demand to meet the increase in labour supply), and that the allocation of this labour across economic sectors remains the same.
- **Country-specific economic conditions:** The study focuses on impacts through the formal labour market channel. The specific economic construct of different countries can and will affect the extent to which changes in HIV investments will drive economic outcomes. While these are accounted for to some extent through the use of country-level economic data, there are certain factors that have not been fully explored in the current study. For example, the size of the informal sector is substantial in several of the study countries, therefore underestimating the economic loss due to HIV. Additionally, some economies are less reliant on labour for economic output, which instead is driven by natural resources, and so are likely to be less impacted by the human capital impacts of HIV.

Other key areas that could be explored in future research include:

- **Disaggregated impacts across vulnerable populations:** The macro-level analysis conducted in this study to explore the overall country-level impacts of changes in investments for HIV could be expanded in future research to better understand how these impacts are distributed across different sub-groups to assess implications in terms of addressing inequality. For example, while this analysis disaggregates data by gender and age, this could be further disaggregated to assess the impact among vulnerable groups of the population including men who have sex with men (MSM), people who inject drugs, people in prison, and others.
- **Impacts on co-morbidities:** HIV infection is a key risk factor for developing other conditions including active tuberculosis, severe malaria and others. Although the current analysis partially accounts for this from an aggregate perspective, more targeted research could explore these relationships more granularly.
- **Impacts on broader health systems:** Investments in HIV can create wider ripple effects on the delivery of non-HIV related healthcare and workforce capacity. By serving to strengthen health systems more broadly, these investments could create additional social and economic gains that have not been captured by the current study.

# Appendix IV.

## Endnotes

1. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
2. Global, regional, and national sex-specific burden and control of the HIV epidemic, 1990-2019, for 204 countries and territories: the Global Burden of Diseases Study 2019. *The Lancet*. 2023; 8: e633–51. [https://doi.org/10.1016/S2352-3018\(21\)00152-1](https://doi.org/10.1016/S2352-3018(21)00152-1).
3. Global HIV & AIDS statistics - Fact sheet. UNAIDS [website]; 2022 (<https://www.unaids.org/en/resources/fact-sheet>, accessed 13 February 2023).
4. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
5. Results Report 2021. The Global Fund; 2023 ([https://www.theglobalfund.org/media/11304/corporate\\_2021resultsreport\\_report\\_en.pdf](https://www.theglobalfund.org/media/11304/corporate_2021resultsreport_report_en.pdf), accessed 13 February 2023).
6. Gazzeh K, Abubakar IR, Hammad E. Impacts of COVID-19 Pandemic on the Global Flows of People and Goods: Implications on the Dynamics of Urban Systems. *MDPI*. 2023; 2022, 11, 429. <https://doi.org/10.3390/land11030429>
7. Results Report 2021. The Global Fund; 2023 ([https://www.theglobalfund.org/media/11304/corporate\\_2021resultsreport\\_report\\_en.pdf](https://www.theglobalfund.org/media/11304/corporate_2021resultsreport_report_en.pdf), accessed 13 February 2023).
8. McFall AM, Menezas NP, Srikrishnan AK, Solomon SS, Anand S, Baishya JJ, Lucas GM, Celentano DD, Mehta SH. Impact of the COVID-19 pandemic on HIV prevention and care services among key populations across 15 cities in India: a longitudinal assessment of clinic-based data. *National Library of Medicine*. 2022; 25(7): e25960. Doi: 10.1002/jia2.25960.
9. Intensity and frequency of extreme novel epidemics. *PNAS*; 2021 (<https://www.pnas.org/doi/10.1073/pnas.2105482118>, accessed 13 February 2023).
10. Staden QV, Laurenzi CA, Toska E. Two years after lockdown: reviewing the effects of COVID-19 on health services and support for adolescents living with HIV in South Africa. *Journal of the International AIDS Society*. 2022; 25:e25904. <https://doi.org/10.1002/jia2.25904>.
11. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
12. From Double Shock to Double Recovery- Implications and Options for Health Financing in the Time of Covid-19. World Bank Group; 2022. (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed>, accessed 13 February 2023).

13. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
14. From Double Shock to Double Recovery- Implications and Options for Health Financing in the Time of Covid-19. World Bank Group; 2022. (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed>, accessed 13 February 2023).
15. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
16. Ibid.
17. A Disrupted Global Recovery. IMF Blog; 2022 (<https://www.imf.org/en/Blogs/Articles/2022/01/25/blog-a-disrupted-global-recovery>, accessed 13 February 2023).
18. Health Inequality Monitor. WHO; 2021 ([https://www.who.int/data/inequality-monitor/publications/report\\_2021\\_hiv\\_tb\\_malaria](https://www.who.int/data/inequality-monitor/publications/report_2021_hiv_tb_malaria), accessed 13 February 2023).
19. Human Capital Project. The World Bank; 2020 (<https://www.worldbank.org/en/publication/human-capital>, accessed 13 February 2023).
20. Medical Training in Botswana. Perelman School of Medicine, University of Pennsylvania; 2023 (<https://www.med.upenn.edu/botswana/education/#:~:text=In%20an%20address%20to%20the%20UN%20General%20Assembly%2C,it%20is%20a%20crisis%20of%20the%20first%20magnitude.%E2%80%9D>, accessed 13 February 2023).
21. Global HIV & AIDS statistics - Fact sheet. UNAIDS [website]; 2022 (<https://www.unaids.org/en/resources/fact-sheet>, accessed 13 February 2023).
22. Ibid.
23. UNAIDS Data 2021. UNAIDS; 2021 ([https://www.unaids.org/sites/default/files/media\\_asset/JC3032\\_AIDS\\_Data\\_book\\_2021\\_En.pdf](https://www.unaids.org/sites/default/files/media_asset/JC3032_AIDS_Data_book_2021_En.pdf), accessed 13 February 2023).
24. Piot P, Russell S, Larson H. Good Politics, Bad Politics: The Experience of AIDS. *American Public Health Association*. 2007; 97(11): 1934–1936. doi: 10.2105/AJPH.2007.121418.
25. Liang C, Qiao S, Olatosi B, Lyu T, Li X. Emergence and Evolution of Big Data Science in HIV Research: Bibliometric Analysis of Federally Sponsored Studies 2000-2019. *International Journal of Medical Informatics*. 2021; 154:104558. doi: 10.1016/j.ijmedinf.2021.104558.
26. Halperin DT, Mugurungi O, Hallett TB, Muchini B, Campbell B, Magure T, Benedikt C, Gregson S. A Surprising Prevention Success: Why Did the HIV Epidemic Decline in Zimbabwe? *PLOS Medicine*. 2011; <https://doi.org/10.1371/journal.pmed.1000414>.
27. AIDS and sexually transmitted diseases. WHO Regional Office for the Eastern Mediterranean; 2023 (<https://www.emro.who.int/asd/health-topics/vulnerable-groups-and-key-populations-at-increased-risk-of-hiv.html>, accessed 13 February 2023).
28. Jin H, Restar A, Beyrer C. Overview of the epidemiological conditions of HIV among key populations in Africa. *J Int AIDS Soc*. 2021; 24 Suppl 3(Suppl 3):e25716. doi: 10.1002/jia2.25716.
29. Ibid.
30. Stover J, Glaubius R, Teng Y, Kelly S, Brown T, Hallet T et al. Modeling the epidemiological impact of the UNAIDS 2025 targets to end AIDS as a public health threat by 2030. *PLOS Med*. 18(10): e1003831. <https://doi.org/10.1371/journal.pmed.1003831>.
31. McLaren ZM, Sharp A, Brouwer E, Nanoo A. The Impact of Anti-Retroviral Therapy on Tuberculosis Detection at the National Level in South Africa. *Am J Trop Med Hyg*. 2018; 99(6):1407-1414. doi: 10.4269/ajtmh.17-0530.
32. Baranov V, Kohler H-P. The Impact of AIDS Treatment on Savings and Human Capital Investment in Malawi. *American Economic Journal: Applied Economics*. 2018; 10(1): 266–306 <https://doi.org/10.3386/w24441>.

- org/10.1257/app.20150369.
33. HIV Treatment as Economic Stimulus: Community Spillover Effects of Mass ART Provision in Rural South Africa. Semantic Scholar. 2016 (<https://www.semanticscholar.org/paper/HIV-Treatment-as-Economic-Stimulus-%3A-Community-of-Bor-McLaren/6ca66238bbd4e5eb963613649e6297a132b513f4>, accessed 13 February 2023).
  34. Global HIV & AIDS statistics - Fact sheet. UNAIDS [website]; 2022 (<https://www.unaids.org/en/resources/fact-sheet>, accessed 13 February 2023).
  35. Ibid.
  36. Ibid.
  37. Millions of lives at risk as progress against AIDS falters. UNAIDS; 2022 ([https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2022/july/20220727\\_global-aids-update](https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2022/july/20220727_global-aids-update), accessed 13 February 2023).
  38. Ibid.
  39. UNAIDS Global AIDS Update 2022. UNAIDS; 2022 ([https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
  40. Dangerous inequalities: World AIDS Day report 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022 ([https://www.unaids.org/sites/default/files/media\\_asset/dangerous-inequalities\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/dangerous-inequalities_en.pdf), accessed 13 February 2023).
  41. Results Report 2021. The Global Fund; 2023 ([https://www.theglobalfund.org/media/11304/corporate\\_2021resultsreport\\_report\\_en.pdf](https://www.theglobalfund.org/media/11304/corporate_2021resultsreport_report_en.pdf), accessed 13 February 2023).
  42. Global condom shortage looms as coronavirus shuts down production. *The Guardian*. 27 March 2020. (<https://www.theguardian.com/world/2020/mar/27/global-condom-shortage-coronavirus-shuts-down-production>; accessed 13 February 2023).
  43. Dema E, Sonnenberg P, Gibbs J et al. How did the COVID-19 pandemic affect access to condoms, chlamydia and HIV testing, and cervical cancer screening at a population level in Britain? (Natsal-COVID). *BMJ*. 2022; <http://dx.doi.org/10.1136/sextrans-2022-055516>.
  44. Results Report 2021. The Global Fund; 2023 ([https://www.theglobalfund.org/media/11304/corporate\\_2021resultsreport\\_report\\_en.pdf](https://www.theglobalfund.org/media/11304/corporate_2021resultsreport_report_en.pdf), accessed 13 February 2023).
  45. Dorward J et al. The impact of the COVID-19 lockdown on HIV care in 65 South African primary care clinics: an interrupted time series analysis. *The Lancet HIV*. 2021; 8: e158–65. [https://doi.org/10.1016/S2352-3018\(20\)30359-3](https://doi.org/10.1016/S2352-3018(20)30359-3)
  46. Jiang T, Liu C, Zhang J, Huang X, Xu J. Impact of the COVID-19 Pandemic on the UNAIDS Six 95% HIV Control Targets. Lausanne: *Frontiers in Medicine*. 2022; 9:818054. doi: 10.3389/fmed.2022.818054.
  47. Lagat H, Sharma M, Kariithi E, Otieno G, Katz D, Masyuko S, Mugambi M, Wamuti B, Weiner B, Farquhar C. Impact of the COVID-19 Pandemic on HIV Testing and Assisted Partner Notification Services, Western Kenya. *AIDS Behav*. 2020; 24(11):3010-3013. doi: 10.1007/s10461-020-02938-7.
  48. Rodrigo C, Rajapakse S. HIV, poverty and women. *International Health*, Volume 2, Issue 1. 2010; <https://doi.org/10.1016/j.inhe.2009.12.003>.
  49. COVID-19 leaves a legacy of rising poverty and widening inequality. *World Bank Blogs*; 2021 (<https://blogs.worldbank.org/developmenttalk/covid-19-leaves-legacy-rising-poverty-and-widening-inequality>, accessed 13 February 2023).
  50. Ibid.
  51. Ibid.
  52. Rodrigo C, Rajapakse S. HIV, poverty and women. *International Health*, Volume 2, Issue 1. 2010; <https://doi.org/10.1016/j.inhe.2009.12.003>.
  53. The Impact of COVID-19 on Adolescent Girls and Young Women and Needed Responses. *The Global Fight*; 2020 (<https://www.theglobalfight.org/wp-content/uploads/2020/10/The-Impact-of-COVID-19->



- on-Adolescent-Girls-and-Young-Women-and-Needed-Responses.pdf, accessed 13 February 2023).
54. The State of the Global Education Crisis: A Path to Recovery: A Joint UNESCO, UNICEF, and World Bank Report. World Bank; 2021 (<https://documents1.worldbank.org/curated/en/416991638768297704/pdf/The-State-of-the-Global-Education-Crisis-A-Path-to-Recovery.pdf>, accessed 13 February 2023).
  55. Every adolescent girl in Africa completing secondary school, safe, strong, empowered: time for Education Plus. UNAIDS; 2021 ([https://www.unaids.org/sites/default/files/media\\_asset/JC3016\\_EducationPlusBrochure\\_En.pdf](https://www.unaids.org/sites/default/files/media_asset/JC3016_EducationPlusBrochure_En.pdf), accessed 13 February 2023).
  56. Left to die: the fate of thousands of people living with HIV in Tigray. *The Conversation*; 2022 (<https://theconversation.com/left-to-die-the-fate-of-thousands-of-people-living-with-hiv-in-tigray-179793>, accessed 13 February 2023).
  57. Increasing droughts and floods on the African continent. *Africa in Focus*. Brookings; 2021 (<https://www.brookings.edu/blog/africa-in-focus/2021/10/08/increasing-droughts-and-floods-on-the-african-continent/>, accessed 13 February 2023).
  58. Austin KF, Noble MD, Berndt VK. Drying Climates and Gendered Suffering: Links Between Drought, Food Insecurity, and Women's HIV in Less-Developed Countries. *Soc Indic Res*. 2021; 154(1):313-334. doi: 10.1007/s11205-020-02562-x.
  59. Low A, Gummerson E, Schwitters A, et al. Food insecurity and the risk of HIV acquisition: findings from population-based surveys in six sub-Saharan African countries (2016–2017). *BMJ Open* 2022; 12:e058704. doi:10.1136/bmjopen-2021-058704.
  60. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
  61. SDG Target 3.3 | Communicable diseases: By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases. WHO; 2023 (<https://www.who.int/data/gho/data/themes/topics/indicator-groups/indicator-group-details/GHO/sdg-target-3.3-communicable-diseases#:~:text=Indicator%20Groups-,SDG%20Target%203.3%20%7C%20Communicable%20diseases%3A%20By%202030%2C%20end%20the,World%20Health%20Statistics>, accessed 13 February 2023).
  62. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
  63. Slogrove AL, Mahy M, Armstrong A, Davies MA. Living and dying to be counted: What we know about the epidemiology of the global adolescent HIV epidemic. *J Int AIDS Soc*. 2017; 20(Suppl 3):21520. doi: 10.7448/IAS.20.4.21520.
  64. Idele P, Gillespie A, Porth T, Suzuki C, Mahy M, Kasedde S, Luo C. Epidemiology of HIV and AIDS among adolescents: current status, inequities, and data gaps. *J Acquir Immune Defic Syndr*. 2014; 66 Suppl 2:S144-53. doi: 10.1097/QAI.000000000000176.
  65. Murewanhema G, Musuka G, Moyo P, Moyo E, Dzinamarira T. HIV and adolescent girls and young women in sub-Saharan Africa: A call for expedited action to reduce new infections. *IJID Reg*. 2022; 5:30-32. doi: 10.1016/j.ijregi.2022.08.009.
  66. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
  67. *Ibid*.

68. Frescura L, Godfrey-Faussett P, Feizzadeh A A, El-Sadr W, Syarif O, Ghys PD; on and behalf of the 2025 testing treatment target Working Group. Achieving the 95 95 95 targets for all: A pathway to ending AIDS. *PLoS One*. 2022;17(8):e0272405. doi: 10.1371/journal.pone.0272405.
69. AIDSinfo: Global data on HIV epidemiology and response; 2021 (<https://aidsinfo.unaids.org/>, assessed 13 February 2023).
70. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
71. From Double Shock to Double Recovery- Implications and Options for Health Financing in the Time of Covid-19. World Bank Group; 2022. (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed>, accessed 13 February 2023).
72. Funding the future of the HIV response. *The Lancet HIV*. 2022; [https://doi.org/10.1016/S2352-3018\(22\)00222-3](https://doi.org/10.1016/S2352-3018(22)00222-3)
73. Ibid.
74. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
75. Ibid.
76. From Double Shock to Double Recovery- Implications and Options for Health Financing in the Time of Covid-19. World Bank Group; 2022. (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed>, accessed 13 February 2023).
77. War sets back the global recovery. *IMF World Economic Outlook*; 2022 (<https://www.imf.org/en/Publications/WEO/Issues/2022/04/19/world-economic-outlook-april-2022>, accessed 13 February 2023).
78. From Double Shock to Double Recovery-Implications and Options for Health Financing in the Time of COVID-19. World Bank Group; 2022 (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed=y>, accessed 13 February 2023).
79. Dangerous Global Debt Burden Requires Decisive Cooperation. *IMF Blog*; 2022 (<https://www.imf.org/en/Blogs/Articles/2022/04/11/blog041122-dangerous-global-debt-burden-requires-decisive-cooperation>, accessed 13 February 2023).
80. Rising interest rates are threatening debt sustainability in Africa. ODI; 2022 (<https://odi.org/en/insights/rising-interest-rates-are-threatening-debt-sustainability-in-africa/>, accessed 13 February 2023).
81. Sub-Saharan Africa's debt problem: Mapping the pandemic's effect and the way forward. Brookings; 2021(<https://www.brookings.edu/research/sub-saharan-africas-debt-problem-mapping-the-pandemics-effect-and-the-way-forward/>, accessed 13 February 2023).
82. Ibid.
83. Sub-Saharan Africa's debt problem: Mapping the pandemic's effect and the way forward. Africa Growth Initiative at Brookings; 2021 (<https://www.brookings.edu/wp-content/uploads/2021/10/COVID-and-debt.pdf>, accessed 13 February 2023).
84. Rising interest rates are threatening debt sustainability in Africa. ODI; 2022 (<https://odi.org/en/insights/rising-interest-rates-are-threatening-debt-sustainability-in-africa/>, accessed 13 February 2023).
85. From Double Shock to Double Recovery- Implications and Options for Health Financing in the Time of Covid-19. World Bank Group; 2022. (<https://openknowledge.worldbank.org/bitstream/>

- handle/10986/35298/September%202022.pdf?sequence=12&isAllowed, accessed 13 February 2023).
86. The Search for Sustainable Solutions to Debt Accumulation in Sub-Saharan Africa. ORF; 2022 (<https://www.orfonline.org/research/the-search-for-sustainable-solutions-to-debt-accumulation-in-sub-saharan-africa/>, accessed 13 February 2023).
  87. From Double Shock to Double Recovery-Implications and Options for Health Financing in the Time of COVID-19. World Bank Group; 2022 (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed=y>, accessed 13 February 2023).
  88. IN DANGER: UNAIDS Global AIDS Update 2022. Geneva: Joint United Nations Programme on HIV/AIDS; 2022. [https://www.unaids.org/sites/default/files/media\\_asset/2022-global-aids-update-summary\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/2022-global-aids-update-summary_en.pdf), accessed 13 February 2023).
  89. Results Report 2021. The Global Fund; 2023 ([https://www.theglobalfund.org/media/11304/corporate\\_2021resultsreport\\_report\\_en.pdf](https://www.theglobalfund.org/media/11304/corporate_2021resultsreport_report_en.pdf), accessed 13 February 2023).
  90. Ibid.
  91. Golin R, Godfrey C, Firth J, Lee L, Minior T, Phelps BR, Raizes EG, Ake JA, Siberry GK. PEPFAR's response to the convergence of the HIV and COVID-19 pandemics in Sub-Saharan Africa. *J Int AIDS Soc.* 2020; 23(8):e25587. doi: 10.1002/jia2.25587.
  92. Collins C, Isbell MT, Karim QA, Sohn AH, Beyrer C, Maleche A. Leveraging the HIV response to strengthen pandemic preparedness. *PLOS Glob Public Health.* 2023; 3(1): e0001511. <https://doi.org/10.1371/journal.pgph.0001511>.
  93. Ibid.
  94. PEPFAR invests nearly \$1.2 billion to support 325,000 health workers across Africa. US Department of State; 2022 (<https://www.state.gov/pepfar-invests-nearly-1-2-billion-to-support-325000-health-workers-across-africa/>, accessed 13 February 2023).
  95. Golin R, Godfrey C, Firth J, Lee L, Minior T, Phelps BR, Raizes EG, Ake JA, Siberry GK. PEPFAR's response to the convergence of the HIV and COVID-19 pandemics in Sub-Saharan Africa. *J Int AIDS Soc.* 2020; 23(8):e25587. doi: 10.1002/jia2.25587.
  96. Ibid.
  97. Ibid.
  98. Hargreaves J, Davey C. Three lessons for the COVID-19 response from pandemic HIV. *The Lancet HIV.* 2020; 7(5): E309-e311. [https://doi.org/10.1016/S2352-3018\(20\)30110-7](https://doi.org/10.1016/S2352-3018(20)30110-7).
  99. Boyce MR et al. Global Fund contributions to health security in ten countries, 2014–20: mapping synergies between vertical disease programmes and capacities for preventing, detecting, and responding to public health emergencies. *The Lancet.* 2021; 9: e181–88. DOI: [https://doi.org/10.1016/S2214-109X\(20\)30420-4](https://doi.org/10.1016/S2214-109X(20)30420-4).
  100. Stover J, Glaubius R, Teng Y, Kelly S, Brown T, Hallet T et al. Modeling the epidemiological impact of the UNAIDS 2025 targets to end AIDS as a public health threat by 2030. *PLOS Med.* 18(10): e1003831. <https://doi.org/10.1371/journal.pmed.1003831>.
  101. Human Capital Project. The World Bank; 2020 (<https://www.worldbank.org/en/publication/human-capital>, accessed 13 February 2023).
  102. UNAIDS Data 2022. UNAIDS; 2022 ([https://www.unaids.org/sites/default/files/media\\_asset/data-book-2022\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/data-book-2022_en.pdf), accessed 13 February 2023).
  103. Haider, H. Malaria, HIV and TB in Mozambique: Epidemiology, disease control and interventions. K4D Helpdesk Report 1088. Brighton, UK: Institute of Development Studies. DOI: 10.19088/K4D.2022.035.
  104. UNAIDS Data 2022. UNAIDS; 2022 ([https://www.unaids.org/sites/default/files/media\\_asset/data-book-2022\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/data-book-2022_en.pdf), accessed 13 February 2023).

105. Ibid.
106. Mahathir M. Women at greater risk of HIV infection. *Arrows Change*. 1997; 3(1):1-2. <https://pubmed.ncbi.nlm.nih.gov/12292992/>, accessed 13 February 2023)
107. Improving Quality and Availability of Ethical Data on Violence against Women Prevalence Across the Asia and the Pacific region. UNFPA Asia and the Pacific Regional Office; 2021 ([https://asiapacific.unfpa.org/sites/default/files/pub-pdf/final\\_unfpa\\_knowvaw\\_data\\_phase\\_1\\_report\\_17\\_may.pdf](https://asiapacific.unfpa.org/sites/default/files/pub-pdf/final_unfpa_knowvaw_data_phase_1_report_17_may.pdf), accessed 13 February 2023)
108. HIV and Gender-Based Violence: Preventing and Responding to Linked Epidemics in Asia and the Pacific Region. UN Women Regional Office for Asia and the Pacific; 2016 ([https://asiapacific.unfpa.org/sites/default/files/pub-pdf/FINAL\\_Publication\\_HIV%20and%20GBV\\_V2.pdf](https://asiapacific.unfpa.org/sites/default/files/pub-pdf/FINAL_Publication_HIV%20and%20GBV_V2.pdf), accessed 13 February 2023)
109. Lelamo Y, Adem A, Dache A, Dona A. Determinants of repeated pregnancy among HIV-positive women on anti retroviral treatments at public health facilities, in Gedeo zone, South Ethiopia: Unmatched case-control study. *Clinical Epidemiology and Global Health*. 13: 100970. <https://doi.org/10.1016/j.cegh.2022.100970>
110. The unfinished agenda of maternal and child health in Africa and Asia: Promising directions to address maternal mortality challenges. The Centre for Policy Impact in Global Health. 2022; (<https://centerforpolicyimpact.org/2022/07/28/the-unfinished-agenda-of-maternal-and-child-health-in-africa-and-asia-promising-directions-to-address-maternal-mortality-challenges/>, accessed 13 February 2023).
111. Zaba B et al. Effect of HIV infection on pregnancy-related mortality in sub-Saharan Africa: secondary analyses of pooled community based data from the network for Analysing Longitudinal Population-based HIV/AIDS data on Africa (ALPHA). *Lancet*. 2013; 381: 1763–71. doi: 10.1016/S0140-6736(13)60803-X.
112. Orphanhood. UNICEF. 2022; (<https://data.unicef.org/topic/hiv/aids/orphanhood/>, accessed 13 February 2023).
113. Jemkemboi G, Aldridge J. Effect of HIV/AIDS on Children's Attitudes Toward Learning: Voices of Teachers and Caregivers in Western Kenya. *Childhood Education*. 2014; 90:3, 219-224, DOI: 10.1080/00094056.2014.910993.
114. Guo Y, Li X, Sherr L. The impact of HIV/AIDS on children's educational outcome: A critical review of global literature. *AIDS Care: Psychological and Socio-medical Aspects of AIDS/HIV*. 2012; 24:8, 993-1012. DOI: 10.1080/09540121.2012.668170.
115. Anabwani, G., Karugaba, G. & Gabaitiri, L. Health, schooling, needs, perspectives and aspirations of HIV infected and affected children in Botswana: a cross-sectional survey. *BMC Pediatr*. 16, 106 (2016); <https://doi.org/10.1186/s12887-016-0643-5>.
116. Cluver, L., Operario, D., Lane, T., & Kganakga, M. "I Can't Go to School and Leave Her in So Much Pain": Educational Shortfalls Among Adolescent 'Young Carers' in the South African AIDS Epidemic. *Journal of Adolescent Research*. 2011; 27(5), 581–605. <https://doi.org/10.1177/0743558411417868>.
117. Madiba S, Ngwenya N. Cultural practices, gender inequality and inconsistent condom use increase vulnerability to HIV infection: narratives from married and cohabiting women in rural communities in Mpumalanga province, South Africa. *Global Health Action*. 2017; 10(sup2):1341597. doi: 10.1080/16549716.2017.1341597.
118. Human Capital Index: Year 3 Progress Report. International Bank for Reconstruction and Development, The World Bank; 2021 (<https://documents1.worldbank.org/curated/en/152711635786365470/pdf/Human-Capital-Project-Year-3-Progress-Report.pdf>, accessed 13 February 2023)
119. The State of the Global Education Crisis: A Path to Recovery: A Joint UNESCO, UNICEF, and World Bank Report. World Bank; 2021 (<https://documents1.worldbank.org/curated/en/416991638768297704/pdf/The-State-of-the-Global-Education-Crisis-A-Path-to-Recovery.pdf>, accessed 13 February 2023).

120. Millions of lives at risk as progress against AIDS falters. UNAIDS; 2022 ([https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2022/july/20220727\\_global-aids-update](https://www.unaids.org/en/resources/presscentre/pressreleaseandstatementarchive/2022/july/20220727_global-aids-update), accessed 13 February 2023).
121. Ibid.
122. Key Populations: Achieving Equitable Access To End AIDS. USAID; 2023 (<https://www.usaid.gov/global-health/health-areas/hiv-and-aids/technical-areas/key-populations>, accessed 13 February 2023).
123. Ibid.
124. Rao A, Schwartz S, Sabin K et al. HIV-related data among key populations to inform evidence-based responses: protocol of a systematic review. *Syst Rev* 7, 220 2018; <https://doi.org/10.1186/s13643-018-0894-3>.
125. TB-HIV, TB-Diabetes, Undernutrition and Other Co-Morbidities. The Union; 2023 (<https://theunion.org/our-work/tuberculosis/tb-co-morbidities>, accessed 13 February 2023).
126. Assessing PEPFAR's Impact: Analysis of Mortality in PEPFAR Countries. Global Health Policy. 2021; (<https://www.kff.org/global-health-policy/issue-brief/assessing-pepfars-impact-analysis-of-mortality-in-pepfar-countries/>, accessed 13 February 2023).
127. TB-HIV, TB-Diabetes, Undernutrition and Other Co-Morbidities. The Union; 2023 (<https://theunion.org/our-work/tuberculosis/tb-co-morbidities>, accessed 13 February 2023).
128. Haider, H. Malaria, HIV and TB in Mozambique: Epidemiology, disease control and interventions. K4D Helpdesk Report 1088. Brighton, UK: Institute of Development Studies. DOI: 10.19088/K4D.2022.035.
129. Assessing PEPFAR's Impact: Analysis of Mortality in PEPFAR Countries. Global Health Policy. 2021; (<https://www.kff.org/global-health-policy/issue-brief/assessing-pepfars-impact-analysis-of-mortality-in-pepfar-countries/>, accessed 13 February 2023).
130. HIV, Population Dynamics and The Labour Force. Economic Impact of HIV Policy Brief; 2023 (<https://hivecon.co.za/wp-content/uploads/2021/09/Economic-Impact-of-HIV-Policy-Brief-03-Population-labour-force.pdf>, accessed 13 February 2023).
131. Ibid.
132. Africa Rising: Harnessing the Demographic Dividend. IMF Working Paper; 2014 (WP/14/143; <https://www.imf.org/external/pubs/ft/wp/2014/wp14143.pdf>, accessed 13 February 2023).
133. Sub-Saharan Africa's Demographic Transition: A Window Of Opportunity For Growth. S&P Global Ratings; 2021 ([https://www.spglobal.com/\\_assets/documents/ratings/research/100344423.pdf](https://www.spglobal.com/_assets/documents/ratings/research/100344423.pdf), accessed 13 February 2023).
134. Demographic Change and Economic Growth in Asia. Program on the Global Demography of Aging; 2008 ([https://cdn1.sph.harvard.edu/wp-content/uploads/sites/1288/2013/10/PGDA\\_WP\\_41.pdf](https://cdn1.sph.harvard.edu/wp-content/uploads/sites/1288/2013/10/PGDA_WP_41.pdf), accessed 13 February 2023).
135. Economic Growth Overview. Economic Impact of HIV Policy Brief; 2023 (<https://hivecon.co.za/wp-content/uploads/2021/09/Economic-Impact-of-HIV-Policy-Brief-07-Growth-%E2%80%93-overview.pdf>, accessed 13 February 2023).
136. Africa Rising: Harnessing the Demographic Dividend. IMF Working Paper; 2014 (WP/14/143; <https://www.imf.org/external/pubs/ft/wp/2014/wp14143.pdf>, accessed 13 February 2023).
137. The impact of HIV/AIDS on the labour force in Sub-Saharan Africa: a preliminary assessment. ILO Geneva; 2005 ([https://www.ilo.org/wcmsp5/groups/public/---ed\\_protect/---protrav/---ilo\\_aids/documents/publication/wcms\\_117178.pdf](https://www.ilo.org/wcmsp5/groups/public/---ed_protect/---protrav/---ilo_aids/documents/publication/wcms_117178.pdf), accessed 13 February 2023).
138. Kampelmann S, Rycx F, Saks Y et al. Does education raise productivity and wages equally? The moderating role of age and gender. *IZA J Labor Econ* 7, 1 2018. <https://doi.org/10.1186/s40172-017-0061-4>.
139. The economic burden of chronic diseases: Estimates and projections for China, Japan, and South Korea. Hohenheim Discussion Papers in Business, Economics and Social Sciences, No. 09-2017; 2017 (<https://www.econstor.eu/bitstream/10419/161476/1/888224214.pdf>, accessed 13 February 2023).

140. Thomas R, Friebel R, Barker K, Mwenge L, Kanema S, Vanqa N, Harper A, Bell-Mandla N, Smith PC, Floyd S, Bock P, Ayles H, Fidler S, Hayes R, Hauck K; HPTN 071 (PopART) Study Team. Work and home productivity of people living with HIV in Zambia and South Africa. *AIDS*. 2019; 33(6):1063-1071. doi: 10.1097/QAD.0000000000002160.
141. Human Development Index (HDI). UNDP Human Development Reports; 2023 (<https://hdr.undp.org/data-center/human-development-index#/indicies/HDI>, accessed 13 February 2023).
142. Creating Markets in Botswana- A Diamond in the Rough: Toward a New Strategy for Diversification and Private Sector Growth. World Bank Group; 2022 (<https://www.ifc.org/wps/wcm/connect/bb819007-f6ba-43bc-a6f5-13cd0508790f/CPSD+Botswana+Exec+Summary+CW05.pdf?MOD=AJPERES&CVID=o7gbctI>, accessed 13 February 2023).
143. Kenya at a glance. FAO in Kenya; 2023 (<https://www.fao.org/kenya/fao-in-kenya/kenya-at-a-glance/en/>, accessed 13 February 2023).
144. Investing in HIV really does pay off. UNAIDS; 2020 ([https://www.unaids.org/en/resources/presscentre/featurestories/2020/february/20200224\\_gow\\_investments#:~:text=It%20has%20been%20shown%20that,%2D%20and%20middle%2Dincome%20countries](https://www.unaids.org/en/resources/presscentre/featurestories/2020/february/20200224_gow_investments#:~:text=It%20has%20been%20shown%20that,%2D%20and%20middle%2Dincome%20countries), accessed 13 February 2023).
145. Amico P, Aran C, Avila C. HIV spending as a share of total health expenditure: an analysis of regional variation in a multi-country study. *PLoS One*. 2010; 5(9):e12997. doi: 10.1371/journal.pone.0012997.
146. Impact on the Health Sector. United Nations Department of Economic and Social Affairs/Population Division. The Impact of AIDS; 2023 (<https://www.un.org/en/development/desa/population/publications/pdf/hiv/impact/chap7.pdf>, accessed 13 February 2023).
147. Tran H, Saleem K, Lim M, Chow EPF, Fairley CK, Terris-Prestholt F, Ong JJ. Global estimates for the lifetime cost of managing HIV. *AIDS*. 2021; 35(8):1273-1281. doi: 10.1097/QAD.0000000000002887.
148. The case for investing in public health: A public health summary report for EPHO 8. WHO Regional Office for Europe; 2014 ([https://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0009/278073/Case-Investing-Public-Health.pdf](https://www.euro.who.int/__data/assets/pdf_file/0009/278073/Case-Investing-Public-Health.pdf), accessed 13 February 2023).
149. Sarkar S, Corso P, Ebrahim-Zadeh S, Kim P, Charania S, Wall K. Cost-effectiveness of HIV Prevention Interventions in Sub-Saharan Africa: A Systematic Review. *EClinicalMedicine*. 2019; 10:10-31. doi: 10.1016/j.eclinm.2019.04.006.
150. Oleribe OO, Enenche E, Udofia D, Ekom E, Osita-Oleribe PI, Kim JU, Taylor-Robinson SD. Assessment of the effectiveness of PMTCT program in eight service delivery points in North Central Nigeria. *HIV AIDS (Auckl)*. 2018;10:253-259. doi: 10.2147/HIV.S157685.
151. Sarkar S, Corso P, Ebrahim-Zadeh S, Kim P, Charania S, Wall K. Cost-effectiveness of HIV Prevention Interventions in Sub-Saharan Africa: A Systematic Review. *EClinicalMedicine*. 2019; 10:10-31. doi: 10.1016/j.eclinm.2019.04.006.
152. The case for investing in public health: A public health summary report for EPHO 8. WHO Regional Office for Europe; 2014 ([https://www.euro.who.int/\\_\\_data/assets/pdf\\_file/0009/278073/Case-Investing-Public-Health.pdf](https://www.euro.who.int/__data/assets/pdf_file/0009/278073/Case-Investing-Public-Health.pdf), accessed 13 February 2023).
153. From Double Shock to Double Recovery-Implications and Options for Health Financing in the Time of COVID-19. World Bank Group; 2022 (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed=y>, accessed 13 February 2023).
154. From Double Shock to Double Recovery-Implications and Options for Health Financing in the Time of COVID-19. World Bank Group; 2022 (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed=y>, accessed 13 February 2023).
155. Ibid.
156. Cashin C, Sparkes S, Bloom D. Earmarking for Health: from Theory to Practice. Geneva: World Health Organization; 2017. Licence: CC BY-NC-SA 3.0 IGO. (<https://apps.who.int/iris/bitstream/handle/10665/255004/9789241512206-eng.pdf>, assessed 13 February 2023).

157. Ibid.
158. Ibid.
159. Ibid.
160. Tax Transparency in Africa-Africa Initiative Progress Report. OECD;2018 (<https://www.oecd.org/tax/transparency/africa-initiative-report-2018.pdf>, accessed 13 February 2023).
161. Tax Evasion in Sub-Saharan Africa. The Borgen Project; 2019 (<https://borgenproject.org/tax-evasion-in-sub-saharan-africa/>, accessed 13 Feb 2023)
162. Albertin G, Devlin D, Yontcheva B. Countering Tax Avoidance in Sub-Saharan Africa's Mining Sector. International Monetary Fund (IMF) (<https://www.imf.org/en/Blogs/Articles/2021/11/05/blog-countering-tax-avoidance-sub-saharan-africa-mining-sector>, accessed 13 February 2023)
163. Munevar D. A Debt Pandemic: Dynamics and Implications of the Debt Crisis of 2020. eurodad; 2021 ([https://www.eurodad.org/2020\\_debt\\_crisis](https://www.eurodad.org/2020_debt_crisis), accessed 13 February 2023).
164. Financial Intermediary Fund for Pandemic Prevention, Preparedness and Response - Engagement and Overview. World Bank Blogs; 2022 (<https://projects.worldbank.org/en/projects-operations/products-and-services/brief/financial-intermediary-fund-for-pandemic-prevention-preparedness-and-response-engagement>, accessed 13 February 2023)
165. Collins C, Isbell MT, Ratevosian J, et al. Build on HIV investments for future pandemic preparedness. *BMJ Global Health* 2021; 6:e007980. doi:10.1136/bmjgh-2021-007980.
166. Boyce MR et al. Global Fund contributions to health security in ten countries, 2014–20: mapping synergies between vertical disease programmes and capacities for preventing, detecting, and responding to public health emergencies. *The Lancet*. 2021; 9: e181–88. DOI:[https://doi.org/10.1016/S2214-109X\(20\)30420-4](https://doi.org/10.1016/S2214-109X(20)30420-4).
167. The Resilience and Sustainability Trust. IMF; 2013 (<https://www.imf.org/en/Topics/Resilience-and-Sustainability-Trust>, accessed 13 February 2023).
168. Using Health Taxes to Support Revenue: An Action Agenda for the IMF and World Bank. Centre for Global Development; 2021 (<https://www.cgdev.org/publication/using-health-taxes-support-revenue-action-agenda-imf-and-world-bank>, accessed 13 February 2023).
169. Health Taxes to Save Lives-- Background Materials: Case Studies. *Tobacconomics*; 2019 (<https://tobacconomics.org/research/health-taxes-to-save-lives-background-materials-case-studies/>, accessed 13 February 2023).
170. Ibid.
171. Distributional Effects of Tobacco Taxation: A Comparative Analysis. World Bank Group; 2019 (<https://documents1.worldbank.org/curated/en/899011554727317064/pdf/Distributional-Effects-of-Tobacco-Taxation-A-Comparative-Analysis.pdf>, accessed 13 February 2023).
172. Using Health Taxes to Support Revenue: An Action Agenda for the IMF and World Bank. Centre for Global Development; 2021 (<https://www.cgdev.org/publication/using-health-taxes-support-revenue-action-agenda-imf-and-world-bank>, accessed 13 February 2023).
173. Smoking and HIV. *AIDSMAP*; 2021 (<https://www.aidsmap.com/about-hiv/smoking-and-hiv>, accessed 13 February 2023).
174. HIV and substance use. Centers for Disease Control and Prevention; 2023 (<https://www.cdc.gov/hiv/basics/hiv-transmission/substance-use.html#:~:text=In%20people%20living%20with%20HIV,the%20overall%20consequences%20of%20HIV>, accessed 13 February 2023).
175. Isett, Roussin K et al. Learning From New York City: A Case Study of Public Health Policy Practice in the Bloomberg Administration. *Journal of Public Health Management and Practice*. 2015; 21(4):p 313-322. DOI: 10.1097/PHH.0000000000000225.
176. Of Course Sin Taxes are Regressive. IEA; 2018 (<https://iea.org.uk/publications/of-course-sin-taxes-are-regressive/>, accessed 13 February 2023).

177. Rodrigo C, Rajapakse S. HIV, poverty and women. *International Health*, Volume 2, Issue 1. 2010; <https://doi.org/10.1016/j.inhe.2009.12.003>.
178. Every adolescent girl in Africa completing secondary school, safe, strong, empowered: time for Education Plus. UNAIDS; 2021 ([https://www.unaids.org/sites/default/files/media\\_asset/JC3016\\_EducationPlusBrochure\\_En.pdf](https://www.unaids.org/sites/default/files/media_asset/JC3016_EducationPlusBrochure_En.pdf), accessed 13 February 2023).
179. The Global Fund's Role and Approach to Domestic Financing for Health (DFH). The Global Fund: Office of the Inspector General; 2022 (GF-OIG-22-11; [https://www.theglobalfund.org/media/12155/oig\\_gf-oig-22-011\\_report\\_en.pdf](https://www.theglobalfund.org/media/12155/oig_gf-oig-22-011_report_en.pdf), accessed 13 February 2023).
180. The Global Fund's Role and Approach to Domestic Financing for Health (DFH). The Global Fund: Office of the Inspector General; 2022 ([https://www.theglobalfund.org/media/12155/oig\\_gf-oig-22-011\\_report\\_en.pdf](https://www.theglobalfund.org/media/12155/oig_gf-oig-22-011_report_en.pdf), accessed 13 February 2023).
181. Shankardass K, Renahy E, Muntaner C, O'Campo P. Strengthening the implementation of Health in All Policies: a methodology for realist explanatory case studies. *Health Policy Plan*. 2014;30(4):462–73. (<https://pubmed.ncbi.nlm.nih.gov/24816571/>, accessed 13 February 2023)
182. Vega J, Irwin A. Tackling health inequalities: new approaches in public policy. *Bull World Health Organ*. 2004;82(7):482.
183. McGuire F, Vijayasingham L, Vassall A et al. Financing intersectoral action for health: a systematic review of co-financing models. *Global Health* 15, 86; 2019. <https://doi.org/10.1186/s12992-019-0513-7>
184. Rasanathan K, Bennett S, Atkins V, Beschel R, Carrasquilla G, Charles J, et al. Governing multisectoral action for health in low- and middle-income countries. *PLOS Med*. 2017;14(4):e1002285.
185. The Global Fund's Role and Approach to Domestic Financing for Health (DFH). The Global Fund: Office of the Inspector General; 2022 ([https://www.theglobalfund.org/media/12155/oig\\_gf-oig-22-011\\_report\\_en.pdf](https://www.theglobalfund.org/media/12155/oig_gf-oig-22-011_report_en.pdf), accessed 13 February 2023)
186. Bekker, LG et al. Advancing Global Health and Strengthening the HIV Response in the Era of the Sustainable Development Goals: the International AIDS Society-Lancet Commission. *Lancet* (London, England) vol. 392,10144: 312-358; 2018. [https://doi.org/10.1016/S0140-6736\(18\)31070-5](https://doi.org/10.1016/S0140-6736(18)31070-5)
187. Dugdale CM, Phillips TK, Myer L, Hyle EP, Brittain K, Freedberg KA, Cunama L, Walensky RP, Zerbe A, Weinstein MC, Abrams EJ, Ciaranello AL. Cost-effectiveness of Integrating Postpartum Antiretroviral Therapy and Infant Care Into Maternal & Child Health Services in South Africa. *PLoS One*; 2019. <https://doi.org/10.1371/journal.pone.0225104>. PMID: 31730630
188. Bulstra CA et al. Integrating HIV Services and Other Health Services: A Systematic Review and Meta-analysis. *PLoS medicine* vol. 18,11 e1003836; 2021. <https://doi.org/10.1371/journal.pmed.1003836>
189. Hontelez J, Bulstra C, Yakusik A, Lamontagne E, Barnighausen T, Atun R. Evidence-based policy making when evidence is incomplete: The case of HIV programme integration. *PLoS Med*. 18(11): e1003835. doi: 10.1371/journal.pmed.1003835.
190. Bukenya D, Van Hout MC, Shayo EH, Kitabye I, Junior BM, Kasidi JR et al. Integrated Healthcare Services for HIV, Diabetes Mellitus and Hypertension in Selected Health Facilities in Kampala and Wakiso districts, Uganda: A qualitative Methods Study. *PLOS Global Public Health*; 2022. <https://doi.org/10.1371/journal.pgph.0000084>
191. Adeyemi O, Lyons M, Njim T et al. Integration of Non-Communicable Disease and HIV/AIDS Management: A Review of Healthcare Policies and Plans in East Africa. *BMJ Global Health*; 2021. <http://dx.doi.org/10.1136/bmjgh-2020-004669>
192. Akugizibwe M, Zalwango F, Namulundu CM et al. "After all, we are all sick": multi-stakeholder understanding of stigma associated with integrated management of HIV, diabetes and hypertension at selected government clinics in Uganda. *BMC Health Serv Res* 23, 20; 2023. <https://doi.org/10.1186/s12913-022-08959-3>.
193. Bulstra CA et al. Integrating HIV Services and Other Health Services: A Systematic Review and Meta-analysis. *PLoS medicine* vol. 18,11 e1003836; 2021. <https://doi.org/10.1371/journal.pmed.1003836>



194. Siraprapasiri T, Ongwangdee S, et al. The impact of Thailand's public health response to the HIV epidemic 1984–2015: understanding the ingredients of success. *Journal of Virus Eradication*, Volume 2, Supplement 4. 2016; ISSN 2055-6640. [https://doi.org/10.1016/S2055-6640\(20\)31093-1](https://doi.org/10.1016/S2055-6640(20)31093-1).
195. Aryeetey GC, Westeneng J, Spaan E, Jehu-Appiah C, Agyepong IA, Baltussen R. Can health insurance protect against out-of-pocket and catastrophic expenditures and also support poverty reduction? Evidence from Ghana's National Health Insurance Scheme. *Int J Equity Health*. 2016; 15(1):116. doi: 10.1186/s12939-016-0401-1.
196. Eze P, Lawani LO, Agu UJ, Acharya Y. Catastrophic health expenditure in sub-Saharan Africa: systematic review and meta-analysis. *Bull World Health Organ*. 2022; 100(5):337-351J. doi: 10.2471/BLT.21.287673.
197. Integrate PrEP provision in UHC. National Health Security Office; 2020 (<http://eng.nhso.go.th/view/1/home/Integrate-PrEP-provision-in-UHC/208/EN-US>, accessed 13 February 2023).
198. Harris J, Thaiprayoon S. Common factors in HIV/AIDS prevention success: lessons from Thailand. *BMC Health Serv Res* 22, 1487 (2022). <https://doi.org/10.1186/s12913-022-08786-6>.
199. Jefferis K, Avalos A, Phillips H, Mmelesi M, Ramaabya D, Nkomo B, Muthoga C, Jarvis JN, Ratladi S, Selato R, Stover J. Five years after Treat All implementation: Botswana's HIV response and future directions in the era of COVID-19. *South Afr J HIV Med*. 2021; 22(1):1275. doi: 10.4102/sajhivmed.v22i1.1275.
200. Sturchio JL, Cohen GM. How PEPFAR's Public-Private Partnerships Achieved Ambitious Goals, From Improving Labs To Strengthening Supply Chains. 2012; VOL. 31, NO. 7. <https://doi.org/10.1377/hlthaff.2012.0585>.
201. Ibid.
202. Shrivastava R, Fonjungo PN, Kebede Y, Bhimaraj R, Zavahir S, Mwangi C, Gadde R, Alexander H, Riley PL, Kim A, Nkengasong JN. Role of public-private partnerships in achieving UNAIDS HIV treatment targets. *BMC Health Serv Res*. 2019;19(1):46. doi: 10.1186/s12913-018-3744-z.
203. Ibid.
204. Uganda 2022 World AIDS Day Commemoration. U.S. Embassy in Uganda; 2022 (<https://ug.usembassy.gov/uganda-2022-world-aids-day-commemoration/>, accessed 13 February 2023).
205. Ayala G, Sprague L, van der Merwe LLA, Thomas RM, Chang J, et al. Peer- and community-led responses to HIV: A scoping review. *PLOS ONE* 16(12): e0260555. <https://doi.org/10.1371/journal.pone.0260555>.
206. Community-Led Monitoring. The United States President's Emergency Plan for AIDS Relief (PEPFAR);2020 (<https://www.state.gov/community-led-monitoring/>, accessed 13 February 2023).
207. Stackpool-Moore L, Logie CH, Cloete A, Reygan F. What Will It Take to Get to the Heart of Stigma in the Context of HIV?. *Journal of the International AIDS Society*; 2022. <https://doi.org/10.1002/jia2.25934>
208. Ellie MP, Kibe PW, Flomo BM, Ngwatu BK. Breaking Barriers: Using Evidence from a Community Treatment Observatory (CTO) to Enhance Uptake of HIV Services in Sierra Leone. *The Journal of Health Design*.; 2019;4(1):163–167. <https://doi.org/10.21853/JHD.2019.70>
209. Oberth B, Baptiste S, Jallow W, Manouan A, Garcia P, Traore AM, Murara J, Boka R. Understanding gaps in the HIV treatment cascade in eleven West African countries: Findings from a regional community treatment observatory. University of Cape Town, Centre for Social Science Research (CSSR); 2019 (<http://www.cssr.uct.ac.za/cssr/pub/wp/441>, accessed 13 February 2023)
210. Jay J, Buse K, Hart M, Wilson D, Marten R, Kellerman S et al. Building from the HIV response towards Universal Health Coverage. *PLOS Med*; 2016; 13: e1002083. <https://doi.org/10.1371/journal.pmed.1002083>

211. Political Declaration on HIV and AIDS: Ending Inequalities and Getting on Track to End AIDS by 2030. United Nations General Assembly; 2021 ([https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021\\_06\\_07\\_unga\\_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee\\_3](https://cdn.who.int/media/docs/default-source/hq-hiv-hepatitis-and-stis-library/2021_06_07_unga_political-declaration-on-hiv-aids.pdf?sfvrsn=94cce9ee_3), accessed 13 February 2023).
212. UNAIDS Data 2022. UNAIDS; 2022 ([https://www.unaids.org/sites/default/files/media\\_asset/data-book-2022\\_en.pdf](https://www.unaids.org/sites/default/files/media_asset/data-book-2022_en.pdf), accessed 13 February 2023).
213. Stover J, Glaubius R, Teng Y, Kelly S, Brown T, Hallet T et al. Modeling the epidemiological impact of the UNAIDS 2025 targets to end AIDS as a public health threat by 2030. *PLOS Med.* 18(10): e1003831. <https://doi.org/10.1371/journal.pmed.1003831>.
214. Stover J, Glaubius R, Teng Y, Kelly S, Brown T, Hallet T et al. Modeling the epidemiological impact of the UNAIDS 2025 targets to end AIDS as a public health threat by 2030. *PLOS Med.* 18(10): e1003831. <https://doi.org/10.1371/journal.pmed.1003831>.
215. From Double Shock to Double Recovery-Implications and Options for Health Financing in the Time of COVID-19. World Bank Group; 2022 (<https://openknowledge.worldbank.org/bitstream/handle/10986/35298/September%202022.pdf?sequence=12&isAllowed=y>, accessed 13 February 2023).
216. UNAIDS HIV Financial Dashboards (<https://hivfinancial.unaids.org/hivfinancialdashboards.html#>, accessed 13 February 2023).
217. TB-HIV, TB-Diabetes, Undernutrition and Other Co-Morbidities. The Union; 2023 (<https://theunion.org/our-work/tuberculosis/tb-co-morbidities>, accessed 13 February 2023).
218. Lewden C, Drabo YJ, Zannou DM, Maiga MY, Minta DK, Sow PS, Akakpo J, Dabis F, Eholie SP, The leDEA West Africa Collaboration. Disease patterns and causes of death of hospitalized HIV-positive adults in West Africa: a multicountry survey in the antiretroviral treatment era. *Journal of the International Aids Society*, Volume 17, Issue 1. 2014; <https://doi.org/10.7448/IAS.17.1.18797>
219. Guo Y, Li X, Sherr L. The impact of HIV/AIDS on children's educational outcome: A critical review of global literature. 2012. <https://doi.org/10.1080/09540121.2012.668170>
220. Mee P, Fearon E, Hassan S, Hensen B, Acharya X, Rice BD, Hargreaves JR. The association between being currently in school and HIV prevalence among young women in nine eastern and southern African countries. 2018; <https://doi.org/10.1371/journal.pone.0198898>
221. Bloom DE et al. The economic burden of chronic diseases: Estimates and projections for China, Japan, and South Korea. 2017 (<https://www.econstor.eu/bitstream/10419/161476/1/888224214.pdf>, accessed 13 February 2023).
222. Thomas R, Rocco F, Barker K et al. Work and home productivity of people living with HIV in Zambia and South Africa. 2019; <https://doi.org/10.1097/QAD.0000000000002160>
223. Stevens PA, Weale M. Education and Economic Growth. 2003; ([https://www.researchgate.net/publication/5200562\\_Education\\_and\\_Economic\\_Growth](https://www.researchgate.net/publication/5200562_Education_and_Economic_Growth); accessed 13 February 2023)

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