Global, regional, and national burden of HIV/AIDS, 1990–2023, with burden attributable to intimate partner violence and forecasted impacts of funding cuts through 2030: results from the Global Burden of Disease Study 2023

Type of manuscript: Original Research Article

Authors: GBD 2023 HIV Collaborators

Word count:

Summary–550

Main text–5810

Corresponding author:

Austin Carter, PhD

Institute for Health Metrics and Evaluation

University of Washington

3980 15th Ave. NE, Seattle, WA 98195 USA

Summary

Background

Despite a general improvement in HIV burden over the past two decades, gender-based vulnerabilities including intimate partner violence (IPV) continue to impact women's vulnerability to HIV, which may be further exacerbated as resources dwindle. Our study, quantifies recent trends, the magnitude of HIV burden associated with IPV, and the potential impact of declining financial support globally.

Methods

Using the Global Burden of Disease (GBD) 2023 framework, we estimated annual HIV incidence, prevalence, and mortality for 204 countries and territories from 1990 to 2023, disaggregated by age and sex. Input data included national HIV programme reports, population-based serosurveys, clinical and vital registration data, and systematically reviewed literature. Countries and territories were grouped based on the availability and completeness of HIV prevalence and mortality data, with tailored modelling approaches employed for each group. To characterise the potential contributions of IPV to HIV burden, time series estimates of the IPV prevalence by location and effect size estimates are combined to generate HIV burden population attributable fractions. To forecast future trends and assess the potential impact of reductions in development assistance for health, we utilised a non-parametric stochastic frontier approach to estimate how funding levels affect ART coverage. Adjustments in future ART coverage were integrated into our forecasts, altering projected rates of HIV-related incidence and mortality. We compared scenarios with and without funding cuts, quantifying the potential epidemiological effects of reduced ART availability by sex.

Findings

Between 2003 and 2023, global new HIV infections declined from 2.85 million (95% uncertainty interval [UI] 2.76–2.96) to 2.06 million (1.88–2.29), and HIV-related deaths decreased from 1.71 million (1.61–1.84) to 0.83 million (0.73–0.96). The number of people living with HIV rose from 26.3 million to 42.4 million (40.3–44.4), reflecting improved survival associated with ART expansion. While women continue to have higher prevalence of HIV than men, the gender gap in incidence has greatly declined. Regionally, sub-Saharan Africa achieved the greatest declines in both incidence (64.3%, 58.0–68.6) and mortality (74.6%, 70.4–78.5), while central and eastern Europe and central Asia recorded increases in incidence (232.1%, 146.5–299.1) and mortality (37.8%, 31.2–45.5). IPV was associated with an estimated 10.7% (1.6–20.4) of HIV deaths among women globally in 2023, corresponding to 40,700 (6400–80,600) deaths, with the highest attributable fractions observed in Oceania (17.4%, 2.8–33.1) and central sub-Saharan Africa (14.2%, 2.1–29.4). Forecasts indicate that funding reductions could decrease ART coverage by 8% globally between 2025 and 2030, resulting in approximately 1.6 new HIV infections among women compared to 1.3 million among men, alongside 790,600 and 670,600 HIV deaths, respectively. These impacts are primarily concentrated in sub-Saharan Africa.

Interpretation

Despite two decades of substantial progress, the global HIV response remains highly sensitive to funding stability and gendered social determinants. The potential contribution of IPV to HIV-related disability-adjusted life-years (DALYs) and mortality among women underscores the need for integrated

interventions that address violence prevention and post-violence care alongside HIV treatment. The projected effects of funding cuts—millions of additional infections and deaths—highlight the fragility of gains achieved and the urgent need to protect HIV financing. Achieving and sustaining UNAIDS 2030 targets will require renewed investment, gender-responsive programming, and resilient health systems capable of providing equitable access to care.

Funding: The Gates Foundation and the National Institute of Allergy and Infectious Diseases

Keywords: HIV; HIV/AIDS; Mortality; Incidence; Intimate partner violence; Funding cuts; Forecasts

Research in Context

Evidence before this study

The global burden of HIV/AIDS has been estimated by the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) and UNAIDS in previous reports. GBD 2019 assessed sex-specific trends, and GBD 2021 provided forecasts of HIV incidence, prevalence, mortality, and treatment coverage up to 2050 in 204 countries and territories. Given a recent Burden of Proof study linking intimate partner violence (IPV) to HIV and considering recent HIV funding cuts, providing population-level estimates of the impact of both IPV and funding cuts on HIV mortality can provide a more nuanced understanding of present and emerging needs for addressing the HIV epidemic. To identify relevant literature, we searched PubMed for the terms (HIV AND ("population attributable fraction*" OR PAF[tiab]) AND ("Intimate Partner Violence"[Mesh] OR "partner violence" OR "spous* abuse")), with no language restrictions, for publications up to September 30, 2025. This search yielded six studies, most of which were limited to national or subnational analyses; only one reported population attributable fraction for HIV mortality, and none provided global estimates. We also searched PubMed for the terms (HIV AND ("funding cuts"[tiab:~1] OR "funding reductions"[tiab:~1] OR "funding reduction"[tiab:~1])), focusing on studies published between the beginning of 2025 and September 30, 2025, with no language restrictions. This search yielded 22 results, including two studies that modelled the impact of funding cuts on HIV/AIDS mortality specifically. First, Brink and colleagues modelled deaths in 26 low- and middle-income countries (LMICs) and extrapolated that an estimated 0.77–2.93 million additional HIV-related deaths occurred in LMICs between 2023 and 2030 due to cuts from the US President's Emergency Plan for AIDS relief (PEPFAR) and other donors, a close estimation of the global impact. More recently, Stover and colleagues estimated between 1.6 and 6.6 million additional HIV-related deaths across 55 countries. This search also identified a review of modelling studies by Ratevosian and colleagues which summarised results from nine modelling studies that spanned several geographical areas, including countries in sub-Saharan Africa, tropical Latin America, and south Asia. To our knowledge, this is the first evaluation of the sex-specific effect of funding cuts on HIV mortality that includes a global estimate.

Added value of this study

New data on prevalence, incidence and mortality were incorporated into this round of GBD HIV estimates. In addition, updated intervention coverage data improved estimates of recent trends in treatment coverage. This study provides the first global, population-level estimates of the potential

impact of IPV on women's HIV-related disability-adjusted life-years (DALYs) and mortality, helping characterise the intersection between gender-based violence and HIV. IPV-attributable fractions were calculated by integrating time-series IPV prevalence and pooled effect sizes for HIV acquisition. In addition, using a non-parametric stochastic frontier approach, our analysis also explores the potential sex-specific impact of recent funding cuts on projected changes in HIV/AIDS incidence and mortality globally. The study's comprehensive modelling allows cross-regional comparisons, quantifies the scale of IPV's association with HIV burden, and identifies how financial contraction could reverse decades of progress, especially for women.

Implications of all available evidence

Our study advances previous efforts to characterise the state of the global HIV epidemic by assessing IPV as a potential driver of HIV-related DALYs and mortality among women. This analysis offers a novel population-level perspective, underscoring the critical role of gender-based violence in shaping the epidemic. Importantly, by integrating new analyses of anticipated losses in antiretroviral therapy (ART) coverage resulting from recent funding reductions, our forecasts of sex disaggregated HIV incidence and mortality can help inform policy makers in responding to funding challenges. Prior evidence suggests that countries were making great progress towards UNAIDS 2030 targets for reducing HIV incidence and mortality. Our forecasts indicate that recent funding cuts will undermine progress, with greater impact for women, and particularly in sub-Saharan Africa. At the same time, trends in central and eastern Europe and central Asia may intensify. Restoring funding and implementing robust measures to protect women from IPV will be essential to prevent the erosion of two decades of gains.

Introduction

Global data suggest that the numbers of incident HIV cases and HIV deaths have been decreasing since 2010, accompanied by a narrowing of gender inequalities in the HIV burden.[1–3] This progress is particularly evident in sub-Saharan Africa (SSA), where HIV service uptake and viral load suppression have increased more rapidly for women than men.[4] Nonetheless, women, particularly in high-burden regions like SSA, continue to face a disproportionate share of new infections.[2] This persistent vulnerability is inextricably linked to broader gender inequalities and the pervasive threat of intimate partner violence (IPV).[5] Such conditions systematically undermine women's agency, making it difficult for them to negotiate safer sex and access reproductive health services.[6–8]

Several studies have found that IPV is one of the leading risk factors linked to HIV in women.[5,9,10] The mechanisms linking IPV to HIV incidence include both direct and indirect pathways. Direct pathways include biological exposure resulting from sexual violence. Indirect pathways operate through IPV-related power asymmetries that constrain individual's sexual agency, including reduced capacity to negotiate condom use, refuse sex, or access HIV prevention and HIV care services.[6] Moreover, studies have found that among women living with HIV, those exposed to IPV and sexual abuse are half as likely to adhere to their antiretroviral therapy compared to those without these experiences.[9,11] Given that sustained viral load suppression is the principal determinant of long-term survival among people living with HIV, IPV-related adherence disruptions may lead to increased rates of virologic failure and subsequent mortality. Understanding these gendered dynamics within the broader epidemic may provide critical context for anticipating how broader policy shifts, such as recent funding reductions, may have uneven and widespread consequences.

As of 2023, most of the international HIV/AIDS funding came from five major donors, including 72.5% from the US government.[12] Through agencies such as the US President's Emergency Plan for AIDS Relief (PEPFAR) and the Global Fund to Fight AIDS, Tuberculosis and Malaria, this aid has supported HIV prevention services and antiretroviral treatment (ART) for millions of people living with HIV (PLHIV) in the past two decades.[13,14] However, due to recent funding reductions from the USA and other entities, most recently a 40% reduction in PEPFAR bilateral HIV/AIDS programs in 2026,[15] it is anticipated that by 2030, there will be a significant reduction or reversal of progress in the global response to HIV.[16,17] This will likely disproportionately affect key and vulnerable populations including girls and women, who already face systemic barriers that reduce their ability to seek HIV care.[18] A United Nations (UN) report found that funding cuts had resulted in suspension and/or termination of over one third of surveyed civil society and women's right organizations working to end violence against women.[19] For example, PEPFAR funded initiatives such as the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) program which sought to directly address the structural drivers of increased HIV risk in adolescent girls and young women (AGYW), including gender-based violence, have already faced severe disruptions.[20]

In this study, we report on the global burden of HIV with a specific focus on the burden attributable to IPV in women. Specifically, we use results from GBD 2023 for the years 2003 through 2023 to systematically assess progress made in HIV incidence and mortality for 204 countries and territories over

the past two decades. We also estimate the percentage of HIV deaths and HIV-related disability-adjusted life-years (DALYs) among women attributable to the independent effects of IPV. Lastly, we examine the potential impact of recent HIV funding cuts on HIV incidence and mortality. By exploring global HIV trends, gender-specific risks such as IPV, and the systemic threat of funding reductions, this paper provides a multi-scalar perspective on the complexity and fragility of the progress made in the fight against HIV.

Methods

Overview

This analysis was conducted as part of the Global Burden of Diseases, Injuries, and Risk Factors (GBD) Collaborator Network, adhering to the standardised GBD protocol. For GBD 2023, we generated annual estimates of HIV burden from 1990 to 2023 for 204 countries and territories, spanning both sexes and all ages from birth through 95 years and older. The overall analytical framework, including the hierarchy of causes and general estimation methodology, has been detailed previously.[21] Here, we outline the specific procedures employed in GBD 2023 for HIV assessment. The study follows the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER),[22] and all relevant data and code are available upon request. Geographical results are presented by seven super-regions: high income; sub-Saharan Africa; southeast Asia, east Asia, and Oceania; south Asia; north Africa and the Middle East; Latin America and the Caribbean; and central Europe, eastern Europe, and central Asia (appendix 1, p 5).

Input data and modelling strategy

To optimise estimation accuracy, countries and territories were categorised based on the type and completeness of available HIV data, and distinct modelling strategies were applied accordingly. Group 1 comprised 50 countries and territories with robust HIV prevalence data from antenatal care clinics or representative population-based seroprevalence surveys—including most of sub-Saharan Africa, as well as the Dominican Republic, Haiti, India, and Papua New Guinea. The remaining 154 locations formed Group 2; of these, 122 had at least some data on HIV-related mortality, while 32 lacked such information. Further stratification within these groups was based on peak prevalence, identified by assessing the maximum value of all-ages and both sexes over the whole time period of estimation in our previous round GBD estimates, and the completeness of vital registration systems (appendix 1, p 4).

For Group 1 locations, we employed the Estimation and Projection Package Age-Sex Model (EPP-ASM), which is a discrete-time compartmental model that simulates adult HIV transmission and progression, stratified by single-year age, sex, disease stage, and treatment status.[2,23] In EPP-ASM, the time-varying transmission rate, r(t), is applied at each 1/10 of a year to the susceptible and infectious populations. “r” represents the number of new cases expected to emanate per year from an adult 15–49 years old with untreated HIV infection.

Group 2 countries and territories were modelled by inputting exogenous estimated HIV incidence trends into the Spectrum framework, another discrete-time compartmental model stratified by age, sex, disease stage, and treatment status. The GBD-adapted EPP-ASM and Spectrum models differ from those used by UNAIDS in terms of model structure, parameterisation, and the specific country-level data used for calibration.

Model applications were tailored to each country's context. For India, where the Sample Registration System (SRS) data was available, we jointly leveraged EPP-ASM and Spectrum to calibrate estimates to age- and sex-disaggregated prevalence surveys and SRS data. The SRS data were used to inform the age and sex distribution of incidence. In addition, we modified the prior distribution for the transmission rate for India to better reflect the comparatively lower magnitude of the epidemic as compared to sub-Saharan African countries for which EPP-ASM parameter prior distributions were initially developed.[24]

Country-specific data on intervention coverage reported to UNAIDS, such as ART and prevention of mother-to-child transmission, were incorporated into model inputs for all locations, regardless of the selected modelling strategy.[25] Similarly, all countries and territories relied on rates of disease progression, which vary across three regional groupings, and HIV-free mortality (the expected background mortality not caused by HIV), which vary by location. Countries and territories in Group 1, utilising EPP-ASM, leveraged population-representative HIV seroprevalence surveys and antenatal care data. All antenatal care data were adjusted to be population representative. Adjusted vital registration data were used for Group 2 countries and territories (appendix 1, section 2.3, pages 5-6).

Intimate partner violence as a risk factor

In this study, we define intimate partner violence (IPV) against women as any lifetime experience of physical or sexual violence perpetrated against women by a current or former intimate partner. We focus our impacts of IPV on women aged 15-49, as this demographic aligns with the standardized reporting metrics our primary data sources for IPV: the Demographic and Health Surveys (DHS) and the WHO Global Database on Prevalence of Violence Against Women. While our analysis focuses on individuals assigned female at birth and does not explicitly exclude same-sex relationships or trans identity, these populations are frequently underrepresented or not disaggregated in the primary data sources used to build our models. While IPV affects all genders and sexual orientations, our current estimates are constrained by the availability of meta-analyzable data for these specific sub-groups. Additionally, we distinguish IPV (defined as occurring since age 15) from violence occurring earlier in life, which is modeled as a separate risk factor (Child Sexual Abuse) within the GBD framework due to its distinct causal pathways.

We assume a causal relationship between IPV and HIV acquisition based on well-established evidence.[10,26] This link is mediated through both direct biological pathways (e.g., increased transmission risk during forced sex due to vaginal trauma) and indirect behavioral/structural pathways (e.g., reduced agency to negotiate condom use, partner non-monogamy, and other risks).[6] Our model specifically quantifies the increased risk of HIV acquisition due to IPV. To characterise the contributions of IPV to HIV burden in 2023, we generated time series estimates of the IPV prevalence by location and relative risk (RRs) of HIV acquisition among women exposed to IPV compared to those not exposed. Because IPV affects incidence while risk factor impacts are measured in terms of mortality and disability, attributable

fractions for prevalence and deaths were generated using cohort-specific cumulative incidence as an approximation of prevalence (appendix 1, section 4, pages 16-22). A uniform global relative risk for HIV acquisition attributable to IPV was derived from our MR-BRT meta-analysis of available scientific evidence. After estimating the fraction of HIV incidence attributable to IPV, we propagated this fraction through the life table to estimate HIV mortality attributable to IPV. This assumes that the proportion of mortality attributable to IPV is proportional to the cumulative incidence of IPV-related infections over time. While IPV also impacts mortality via reduced treatment adherence, our primary model captures the burden through the acquisition pathway to align with available meta-analytical relative risks. By using this birth-cohort approach to bridge the temporal gap between initial acquisition and death, we ensure the mortality PAF reflects the cumulative pool of infections that would have been avoided in the absence of IPV.

Funding cut forecasts

To estimate the impact of reduced development assistance for health, we compared two forecasting scenarios for each location. Our baseline scenario represents a continuation of recent trends, projecting antiretroviral therapy (ART) coverage based on the observed rate of change between 2018 and 2023. We then developed a funding-cut scenario that modifies these projections based on the historical relationship between HIV-specific health spending and treatment coverage.

Using a non-parametric stochastic frontier approach [27] we modeled how changes in total HIV spending—comprising both domestic and international sources—impact ART access across 134 low- and middle-income countries. This model assumes that country-specific efficiencies remain constant and that domestic funding does not increase to substitute for lost international aid. By integrating these coverage rates into our forecasting framework, we estimated the resulting changes in mortality among people living with HIV and incidence among susceptible individuals. Results are summarized as the relative change in ART coverage, additional new HIV infections, and additional HIV-related deaths (see Appendix 1, Section 5 for more details).

GBD research and reporting practices

This research complies with the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) statement[22] and a GATHER checklist is provided in appendix 1 pp 25. The University of Washington Institutional Review Board approved the GBD study (STUDY00009060) up to July 26, 2026.

Role of the funding source

The funders had no role in the design of this study, data collection, data extraction, data analysis, data interpretation, or the writing for this manuscript. The corresponding author had full access to the data used in this study and bore the final responsibility for the decision to submit this manuscript for publication.

Results

In 2023, we estimated 42.4 million (95% UI 40.3–44.4) PLHIV (figure 1). Over the past two decades (2003–2023), the annual number of new HIV infections gradually declined from 2.85 million (2.76–2.96) to 2.06 million (1.88–2.29). In contrast, deaths initially peaked in 2004, at 1.71 million (1.61–1.83) and declined thereafter, reaching a plateau in recent years. Of the HIV cases in 2023, 1.03 million (0.935–1.14) cases in males and 1.03 million (0.930–1.17) cases in females were new infections. While recent evidence has highlighted that the sex differences in incident cases have narrowed in recent years,[2] females still make up a greater number of prevalent cases compared to males. Of the PLHIV, 19.1 million (17.6–20.5) were male and 23.4 million (22.2–24.6) were female.

Geographically, countries in sub-Saharan Africa had the highest age-standardised HIV incidence rate and mortality rate in 2023, followed by the central Europe, eastern Europe, and central Asia super-region and Latin America and the Caribbean super-region (figure 2). Within the sub-Saharan Africa the country of Lesotho had the highest age standardized incidence rate (587.5 per 100,000, 95% UI 330.7–932.5) and the highest age-standarised mortality rate (370.9 per 100,000, 296.9–460.1; figure 2). Within the central Europe, eastern Europe, and central Asia super-region, Ukraine in eastern Europe had the highest age-standardised incidence rate (98.7 per 100,000, 95% UI 70.1–143.9) and the highest age-standardised mortality rate (10.1 per 100,000, 8.3–11.6) (Figure 2). Within Latin America and the Caribbean, Haiti had the highest age-standardised incidence rate (134.0 per 100,000, 95% UI 80.5–221.5) and age-standardised mortality rate (55.9 per 100,000, 40.7–77.6) (Figure 2).

Despite these figures, several countries have made substantial progress in reducing HIV incidence over the past two decades. Between 2003 and 2023, we saw the largest declines in the HIV incidence and mortality rate in sub-Saharan Africa (Figure 3). Leading the region's progress, Burkina Faso achieved a 92.4% (95% UI 86.9–95.8) reduction in HIV incidence and a 91.1% (87.9–94.1) reduction in mortality. Conversely, we saw a large increase in the HIV incidence and mortality rate in central and eastern Europe and central Asia. In this super-region, Russia had the highest increase in HIV incidence (371.0;

232.6–509.7) and mortality (83.7; 75.8-93.1). A smaller increase in HIV incidence is seen in Latin America and the Caribbean (Figure 3).

In 2023, the global population attributable fraction (PAF) of HIV deaths associated with IPV for females was 10.7% (95% UI 1.6–20.4). Among all regions, Oceania, central sub-Saharan Africa, and eastern sub-Saharan Africa had the highest PAFs of HIV deaths associated with IPV in 2023 (Figure 4). In Oceania, the PAF of HIV deaths associated with IPV for females was 17.4% (95% UI 2.8–33.1), corresponding to 115 HIV deaths (19.5–251) (appendix 2, table 2; appendix 2, figure 4). In central sub-Saharan Africa, approximately 14.2% (2.1–29.4) of HIV deaths among females were associated with IPV in 2023, corresponding to 3660 HIV deaths (544–7630) (appendix 2, table 2; appendix 2, figure 4). Finally, in eastern sub-Saharan Africa, approximately 13.2% (2.0–25.3) of HIV deaths among females were associated with IPV in 2023, corresponding to 15,100 HIV deaths (2,320–29,800) (appendix 2, table 2; appendix 2, figure 4). The proportion of disease burden measured in disability-adjusted life-years (DALYs) that is associated with IPV follows similar patterns (appendix 2, figure 1). In 2023, IPV was associated with an estimated 10.1% (95% UI 1.5–19.1) of the total HIV-related DALYs among females globally. Like the PAF for mortality, the PAF for DALYs is highest in Oceania where 16.8% (2.7–32.1) of the HIV burden, measured in DALYs, in females was attributable to IPV. The heterogeneity observed in the PAFs for HIV mortality and DALYs across the region is primarily driven by the wide variation in local IPV exposure (appendix 2, table 3).

Table 1 provides estimates for the impact of funding cuts on ART coverage, new HIV infections, and HIV-related deaths between 2025 and 2030 globally, in sub-Saharan Africa, and in the ten countries with the greatest projected change in ART coverage. Forecasted funding cuts implemented between 2025 and 2030 will result in an 8.1% decrease in global ART coverage. Sex-disaggregated projections suggest that females will continue to bear a disproportionate burden of the epidemic accounting for 1.6 million new infections and 790,600 deaths compared to 1.3 million infections and 670,600 deaths among their male counterparts. Sub-Saharan Africa, which will shoulder most of this burden, will see 1.4 million new infections and 733,900 HIV deaths among females compared to roughly 1 million new infections and 611,800 HIV deaths among males between 2025 and 2030.

The global and sub-Saharan Africa estimates mask great variations by country. Among the countries that could see the greatest declines in ART coverage, all but Sudan are in sub-Saharan Africa. Funding cuts in Sudan will result in the largest relative change in ART coverage with an estimated 66.9% decline between 2025 and 2030, which is expected to result in 16,700 new HIV infections and 23,000 HIV deaths among females. Within sub-Saharan Africa, countries that will see the largest declines in ART coverage include Somalia, Mozambique, Burundi, the Gambia, Cameroon, South Sudan, Chad, Malawi, and Guinea-Bissau. Mozambique is expected to see the greatest increased HIV burden from funding cuts. Between 2025 and 2030, ART coverage is expected to decline by 29.1%, which will result in 547,400 new HIV infections and 134,600 HIV deaths among females.

Discussion

Over the past two decades, mortality rates among PLHIV have fallen since their peak in 2004, coinciding with widespread availability of effective ART. Regionally, sub-Saharan Africa continues to have the highest rates of both incidence and mortality globally, although this region is also responsible for the greatest reductions in incidence and mortality over the past two decades. In contrast, HIV incidence and mortality in central Europe, eastern Europe, and central Asia have increased by 232% and 30.7%, respectively. While substantial progress has been made in reducing overall HIV incidence and narrowing gender differences in incident cases worldwide, girls and women continue to be disproportionately affected. Importantly, the women-only analysis revealed IPV contributes substantially to HIV-related deaths in regions including eastern and central sub-Saharan Africa. Recent funding reductions are expected to result in millions of additional new infections and HIV deaths between 2025 and 2030, a burden that will have greater effects on women than men. Together, these findings highlight the progress made over the past two decades in some regions while also highlighting the continued rise of HIV incidence and mortality in others and the effect of IPV to 2023 findings. Moreover, our projections suggest that recent funding reductions place many countries off track to achieve the UNAIDS 95-95-95 and 90% mortality reduction targets by 2030 with the largest gap in progress projected to be among women, and sub-Saharan Africa.

Our findings of rising HIV incidence and mortality in central Europe, eastern Europe, and central Asia have been previously documented.[28,29] Among other things, injection drug use has been highlighted as an important driver of the HIV epidemic in this region. Yet, recent evidence suggests that sex between men may have overtaken unsafe injection as the route of transmission of most new infections in this region.[30] Some estimates indicate that transmission through injection drug use in eastern Europe has decreased from 34% in 2012 to 28% in 2021.[30] A recent analysis in 12 eastern European and central Asian countries found that prioritising ART and programmes for key populations in the region could avert 32% of new infections and 27% of HIV-related deaths by 2030 alone.[31]

In Latin America and the Caribbean, the observed increase in HIV incidence and stagnation in HIV-related mortality in some countries stands in stark contrast to the progress seen in sub-Saharan Africa. Recent reports have also highlighted this stagnation in mortality and increases in incidence in the region.[18] These trends are driven in part by a persistent clinical paradox: despite widespread ART availability, a high proportion of people living with HIV continue to present late to care, often with advanced HIV disease.[32] The region's HIV landscape is further complicated by long-established migration patterns, political conflict, and economic instability which have resulted in unprecedented waves of migration complicating regional efforts to maintain engagement in continuous care required for viral load suppression.[33,34]

For years, sex differences in HIV incidence have been observed.[2] The closing of the sex difference in incidence may reflect important advances in reducing risk among women. However, evidence suggests that women on average acquire HIV as much as five to seven years earlier than men.[35] Explanations for this are many, including women's higher biological susceptibility to HIV and STIs than men and age discrepancy in relationships. Women's age discrepancies in relationships may put them at higher risk for

gender-based violence such as IPV, which in turn puts them at risk for HIV.[36] Our analysis found that approximately 10% of all HIV-related mortality and 10% of HIV-related DALYs globally can be attributed to IPV. IPV results in greater risk of HIV acquisition and creates barriers to HIV prevention, testing, treatment, and care.[10,37] The high PAFs for IPV in Oceania are driven by the high prevalence of IPV in the region. A 2018 study estimating intimate partner violence against women found high rates of lifetime and past-year IPV across Oceania.[38] For example, in Melanesia, the study found that 51% of women reported ever experiencing IPV and 30% reported past-year IPV. In contrast, central Europe, eastern Europe, and central Asia's small PAFs for IPV are consistent with estimates of IPV prevalence in this region. Moreover, previous findings have emphasised that the key risk in this region may be unsafe injection practices[39] and unsafe sex.[30]

Our model on the effects of funding cuts on HIV incidence and mortality suggests that the impact will negatively affect the progress made in HIV over the past two decades. The reduction in ART coverage due to funding cuts between 2025 and 2030 is expected to result in large increases in cumulative new HIV infections and HIV deaths, particularly among women, and particularly in sub-Saharan Africa, by 2030. While the impact of reduced spending on HIV incidence will be relatively immediate due to decreased prevention and increased community viral load, the impact on mortality is mediated by the clinical progression of the disease. Consequently, the ratio of additional infections to additional deaths in our results is driven by the timing of the funding shocks; earlier cuts (as seen in Malawi) allow for a longer period of cumulative mortality, whereas later cuts (as seen in Mozambique) have less opportunity to manifest as increased deaths within our study period.

Consistent with research that explored reliance on development aid across countries,[27] our findings suggest that the largest decrease in ART coverage would come from countries that rely heavily on external funding. For example, Mozambique, Burundi, the Gambia, Cameroon, South Sudan, Malawi, and Guinea-Bissau all finance more than 80% of their HIV care and treatment spending with development assistance.[27] Our findings are also consistent with previous studies that have found that US funding cuts would reverse decades of progress and lead to large increases in deaths and new cases of HIV.[31,40] For example, Stover et al. estimated that complete cessation of US funding would result in an additional 4.1 million (1.6-6.6) AIDS-related deaths between 2025 and 2030. Because our funding cut scenario differs, capturing planned cuts across all locations, we estimate a smaller mean impact as complete cessation of US funding did not end up occurring. Still, recent funding losses have already disrupted supply chains, left thousands of health clinics without staff, forced health facility closures, and destabilised critical community health systems.[18]

Development assistance for HIV is primarily financed by two institutions, PEPFAR and the Global Fund to fight AIDS, Tuberculosis and Malaria. Through coordination with national government and partners, agencies like the US Agency for International Development (USAID) helped ensure these funds reached intended program. A recent study evaluating the effects of this aid on mortality over the past two decades found that USAID funding was associated with a 65% reduction in mortality from HIV/AIDS, representing approximately 25.5 million deaths.[41] Without sustained investments, the projected

increase in deaths and new cases of HIV could place the UNAIDS 95-95-95 targets increasingly out of reach. At the end of 2024, an estimated 87% of all PLHIV knew their HIV status, 89% of those diagnosed received ART, and 94% were virally suppressed, reflecting steady but incomplete progress towards these goals.[42] Moreover, the effects of funding cuts on ART coverage and subsequent infections and mortality will not be felt equally across the population and instead may widen health inequities across the most vulnerable populations. Even before funding losses, the gains against HIV were not evenly distributed. For example, adolescent girls and young women had disproportionately high HIV risk, particularly in sub-Saharan Africa.[18] Women, particularly adolescent girls and young women, face harmful gender norms, differentials in power relations, and violence, making them particularly vulnerable to HIV.[5] The anticipated withdrawal of PEPFAR funded initiatives such as DREAMS,[43] which integrate IPV and HIV services, erodes the clinical and social safeguards that have helped mitigate the risk of HIV and gender based violence for AGYW.

To mitigate these impacts, several recommendations have been put forward, including the need to strengthen public sector–led health service delivery, harnessing technology, targeting investments for key populations, leveraging private-sector collaborations, tapping into non-traditional sources of capital, and domestic resources.[44] Yet, a previous analysis that estimated the amount of additional spending governments could invest for HIV/AIDS found that many middle-income and low-income countries would be unable to replace even 10% of the funds development assistance contributes towards care and treatment.[27] Moreover, recent estimates of what is still possible to achieve in the fight against HIV suggest that enormous progress can still be made by 2030 assuming that the Global Fund contributes an additional $18 billion and that other development assistance remains similar to 2020–2022.[14]

In this update to GBD estimates, adjustments to our mortality estimation process had several effects on our estimates. Specifically, we chose to no longer average mortality estimates from our calibrated mechanistic model with estimates arising from demographic modelling in high HIV–prevalence locations. In general, this resulted in higher estimated mortality because the demographic-based estimates were consistently lower than the mechanistic model estimates. Another consequence of this adjustment was the removal of an adjustment of incidence corresponding to the adjustment in mortality, ensuring consistency between incidence, prevalence, and mortality. The removal of the incidence adjustment also resulted in widespread increases in incidence. Finally, HIV mortality estimates were included in the GBD Cause of Death correction process that scales cause-specific mortality rates to collectively add up to equal all-cause mortality estimates. This inclusion had variable impacts by location and time, but overall, did not substantially modify our estimates at an aggregate level.

Several limitations should be considered when interpreting the findings of this study. First, the PAF calculation traditionally treats IPV as an isolated risk factor, however IPV exist within a syndemic of overlapping vulnerabilities. Because these factors are often collinear, the PAF should be interpreted as an estimate of the burden associated with the presence of IPV, acknowledging that eliminating IPV alone might not eliminate the entire attributable burden. Second, our findings are likely to represent a conservative “lower bound” estimate of the total mortality burden for several reasons. Our model does not capture the impact of IPV on ART adherence, viral load suppression, or HIV-related mortality post-

acquisition or their syndemic effects and therefore overlooks the fact that individuals may be exposed to multiple risk factors over time, and that factors, including biomedical factors such as viral load suppression, can also affect mortality. The clinical progression pathway remains a critical area for future modelling. Similarly, because our model focuses on the direct acquisition of HIV, it also doesn't capture the indirect burden mediated through subsequent engagement in unsafe sex following IPV. Furthermore, as this analysis is restricted to adult populations, it excludes the contribution of IPV to paediatric HIV through vertical HIV transmission. A recent study exploring the relationship between IPV and vertical HIV transmission in 46 African countries found that one in eight new paediatric HIV acquisitions could have been averted though elimination of IPV.[45] Consequently, the total intergenerational burden attributable to IPV is not reflected in these estimates. Further research should explore ways to integrate knowledge of all relevant pathways to improve measurement of the contribution of IPV to all HIV outcomes. Moreover, IPV is often under-reported and data in some regions are limited.[46,47] Although our modelling is designed to minimize bias, geographic and temporal gaps in primary data represent a key source of model uncertainty. In regions where the primary data are scarce, our uncertainty intervals widen significantly, reflecting the reliance on regional patterns and predictive covariates.

Furthermore, our modelling approach uses a single, uniform global relative risk for HIV acquisition. While we acknowledge that the social, legal, and cultural contexts of IPV vary significantly across regions, there is currently insufficient longitudinal data to justify the parameterization of location-specific relative risks. Consequently, our estimated relative risk may not capture regional nuances in the IPV-HIV relationship, though it represents the most robust synthesis of existing longitudinal evidence via our MR-BRT meta-analysis framework. This global estimate differs from recent pooled analysis such as those presented by Kuchukhidze et al[9] due to fundamental differences in temporal framing. While Kuchukhidze et al utilized past-year IPV to predict recent HIV infection our model utilizes a lifetime IPV exposure definition. This results in a more conservative relative risk, as it averages risk across a survivor's entire life course rather than isolating periods of active violence.

The impact of IPV on HIV outcomes in men was not modeled due to the scarcity of high-certainty longitudinal data. However, cross-sectional have found an association between IPV and HIV in men, specifically men who have sex with men (MSM).[48] Moreover, effect sizes for gender-diverse individuals is limited despite evidence of an association between IPV and HIV in these groups.[49] More granular data is also needed to differentiate severity, frequency, and timing of IPV. By defining IPV as 'any lifetime experience of physical or sexual violence,' we were unable to distinguish between severe and potentially less severe IPV. Furthermore, because many data sources focus exclusively on marital or cohabitating relationships, our estimates may not fully capture the risks associated with violence in other relationships.

Finally, there is considerable uncertainty in the estimated effects of funding cuts. n our analysis, we assumed that declines in ART coverage would be the sole driver of changes in HIV incidence and mortality. However, funding reductions may impact not only treatment but also a range of preventive interventions, including condom distribution, IPV prevention initiatives, and harm-reduction services for

people who inject drugs. In fact, the majority of HIV prevention funding—nearly 80% in sub-Saharan Africa—has come from external sources.[18] Because our model specifically isolates the mortality associated with ART interruptions, it provides a worst-case scenario for immediate mortality while serving as a lower bound estimate for the overall projected burden as it underrepresents the long-term surge in new infections and subsequent deaths that would follow the earlier erosion of primary prevention. It is also important to note that national programmes will likely try to reallocate available resources, or that other donors could help fill funding gaps. Moreover, our estimates do not account for changes in US aid strategy such as changes outlined in the recently published America First Strategy, which sets out to sign partner country agreements referred to as "compacts", engaging aid-receiving countries in co-financing agreements.[50] Under these compacts, the USA would increase aid for frontline workers and commodities, including ART, and require countries to plan for eventual aid discontinuation.[51] Implementation of these compacts would mean our results overestimate the impact of future ART coverage and HIV incidence and mortality. Finally, while our modeling approach utilizes the same EPP-ASM and Spectrum simulation frameworks as UNAIDS, we modify the input data and model parameters. By incorporating these internal GBD parameters and utilizing tailored country-level data for calibration, we ensure that our HIV estimates are fully consistent with GBD's global demographic and cause-of-death assessments. Consequently, while global estimates are in general agreement with UNAIDS, regional divergences stem from our specific input data.

Despite these limitations, this study's integration of IPV as a risk factor and its forecasts of funding-related disruptions to ART coverage represent clear advances in the understanding of both the social determinants and systemic fragility of the HIV response. Our work advances understanding of HIV burden at both the global and local level by combining new data with a number of methodological advances while presenting novel results. We are the first to present global numbers on the association between IPV and HIV, combining results from a systematic review on the relationship between IPV and HIV with our GBD estimates of burden. These results shine a spotlight on one of the many complex factors that contribute to continued transmission of HIV. In addition, we combine stochastic frontier modelling estimates of the impact of forecasted funding cuts on ART coverage to generate a set of forecasting scenarios that approximate the impact of reduced funding on future HIV burden. While other work has built scenario-based projections of funding, our estimated funding forecasts are the result of a comprehensive data-collection effort capturing what each country plans to contribute to total official development assistance through the remainder of the decade.

The results of this study have important implications for future HIV prevention and care. Consistent with the 2030 Agenda for Sustainable Development, which calls for the commitment of countries to provide universal health coverage,[52] and in light of recent funding cuts, developing plans to integrate HIV prevention and care into national health financing mechanisms is a critical next step in addition to exploring cross-sector collaborations and other sources of support and funding. Moreover, IPV prevention and post-IPV care should remain an important component of the global HIV response. Targeting the different pathways leading to HIV morbidity and mortality will require a multi-pronged approach. Trauma-informed HIV prevention services which incorporate intentional efforts to

acknowledge and address IPV may help reduce HIV risk.[53] For example, situating trauma-informed sexual health services including HIV prevention programs within settings which serve IPV victims may be an effective strategy for preventing HIV among this population. In addition, advocating for interventions that address the interconnected economic and safety needs of victims could help empower victims to negotiate safer sex and increase their engagement with HIV prevention and care services.[8] Finally, gender is a key social determinant of health,[54] and therefore any health system strengthening effort must be gender responsive. Gender-responsive health systems are informed by both sex-disaggregated and gender-disaggregated data and actively seek to address key power relations among women and girls, men and boys, and gender-minority individuals.[55] Integrating HIV care into national health financing mechanisms and advancing gender-responsive health systems are essential steps towards building resilient primary-care systems capable of achieving equitable and sustainable health outcomes.

List of Tables and Figures

Acknowledgments

The Global Burden of Disease Study is primarily funded by the Bill & Melinda Gates Foundation (OPP1152504). Additional funding for this project is provided by the National Institute of Allergy and Infectious Diseases of the NIH (R01AI152721).

Data sharing

To download the data used in these analyses, please visit the Global Health Data Exchange website at: https://ghdx.healthdata.org/gbd-2023. Statistical code used for GBD estimation is available upon request - send requests to engage@healthdata.org.

References

1. Carter A, Zhang M, Tram KH, et al. Global, regional, and national burden of HIV/AIDS, 1990–2021, and forecasts to 2050, for 204 countries and territories: the Global Burden

of Disease Study 2021. *The Lancet HIV*. 2024;11(12):e807-e822. doi:10.1016/S2352-3018(24)00212-1

2. Jahagirdar D, Walters MK, Novotney A, et al. 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 HIV*. 2021;8(10):e633-e651. doi:10.1016/S2352-3018(21)00152-1

3. Frank TD, Carter A, Jahagirdar D, et al. Global, regional, and national incidence, prevalence, and mortality of HIV, 1980–2017, and forecasts to 2030, for 195 countries and territories: a systematic analysis for the Global Burden of Diseases, Injuries, and Risk Factors Study 2017. *The Lancet HIV*. 2019;6(12):e831-e859. doi:10.1016/S2352-3018(19)30196-1

4. Monod M, Brizzi A, Galiwango RM, et al. Longitudinal population-level HIV epidemiologic and genomic surveillance highlights growing gender disparity of HIV transmission in Uganda. *Nat Microbiol*. 2023;9(1):35-54. doi:10.1038/s41564-023-01530-8

5. Jewkes RK, Dunkle K, Nduna M, Shai N. Intimate partner violence, relationship power inequity, and incidence of HIV infection in young women in South Africa: a cohort study. *The Lancet*. 2010;376(9734):41-48. doi:10.1016/S0140-6736(10)60548-X

6. Dunkle KL, Decker MR. Gender-Based Violence and HIV: Reviewing the Evidence for Links and Causal Pathways in the General Population and High-risk Groups. *American Journal of Reproductive Immunology*. 2013;69(s1):20-26. doi:10.1111/aji.12039

7. The Lancet Hiv. Addressing inequalities still key to ending HIV/AIDS. *The Lancet HIV*. 2023;10(1):e1. doi:10.1016/S2352-3018(22)00376-9

8. Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *The Lancet*. 2008;372(9640):764-775. doi:10.1016/S0140-6736(08)60887-9

9. Kuchukhidze S. The effects of intimate partner violence on women's risk of HIV acquisition and engagement in the HIV treatment and care cascade: a pooled analysis of nationally representative surveys in sub-Saharan Africa. *The Lancet*. 2023;10:e107-e117.

10. Spencer CN, Khalil M, Herbert M, et al. Health effects associated with exposure to intimate partner violence against women and childhood sexual abuse: a Burden of Proof study. *Nat Med*. 2023;29(12):3243-3258. doi:10.1038/s41591-023-02629-5

11. Cluver LD, Zhou S, Orkin M, et al. Impacts of intimate partner violence and sexual abuse on antiretroviral adherence among adolescents living with HIV in South Africa. *AIDS*. 2023;37(3):503-511. doi:10.1097/QAD.0000000000003440

12. Wexler, Adam, Kates, Jennifer, Oum, Stephanie, Lief, Eric. Donor Government Funding for HIV in Low- and Middle-Income Countries in 2023. KFF. July 22, 2024. Accessed June 26, 2025. https://www.kff.org/report-section/donor-government-funding-for-hiv-in-low-and-middle-income-countries-in-2023-key-findings/

13. Tram KH, Ratevosian J, Beyrer C. By executive order: The likely deadly consequences associated with a 90-day pause in PEPFAR funding. *J Int AIDS Soc*. 2025;28(3):e26431. doi:10.1002/jia2.26431

14. Hallett TB, Menzies NA, Resch S, et al. The case for optimal investment in combating HIV, tuberculosis, and malaria: a global modelling study. *The Lancet*. 2025;406(10500):261-270. doi:10.1016/S0140-6736(25)00831-1

15. kffadamw. Administration Releases Additional Details of Fiscal Year 2026 Budget Request. KFF. June 4, 2025. Accessed February 24, 2026. https://www.kff.org/global-health-policy/administration-releases-additional-details-of-fiscal-year-2026-budget-request/

16. Brink DT, Martin-Hughes R, Bowring AL, et al. Impact of an international HIV funding crisis on HIV infections and mortality in low-income and middle-income countries: a modelling study. *The Lancet HIV*. 2025;12(5):e346-e354. doi:10.1016/S2352-3018(25)00074-8

17. Hontelez JAC, Goymann H, Berhane Y, et al. The impact of the PEPFAR funding freeze on HIV deaths and infections: a mathematical modelling study of seven countries in sub-Saharan Africa. *eClinicalMedicine*. 2025;83:103233. doi:10.1016/j.eclinm.2025.103233

18. *AIDS, Crisis and the Power to Transform*. UNAIDS Global AIDS Update; 2025. https://www.unaids.org/sites/default/files/2025-07/2025-global-aids-update-JC3153_en.pdf

19. Zulver, J. *At Risk and Underfunded: How Funding Cuts Are Threatning Efforts to End Violence against Women and Girls*. UN Women; 2025.

20. Impact of US funding cuts on HIV programmes in East and Southern Africa | UNAIDS. Accessed February 23, 2026. https://www.unaids.org/en/resources/presscentre/featurestories/2025/march/20250331_ESA-region_fs

21. Vos T, Lim SS, Abbafati C, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. *The Lancet*. 2020;396(10258):1204-1222. doi:10.1016/S0140-6736(20)30925-9

22. Stevens GA, Alkema L, Black RE, et al. Guidelines for Accurate and Transparent Health Estimates Reporting: the GATHER statement. *The Lancet*. 2016;388(10062):e19-e23. doi:10.1016/S0140-6736(16)30388-9

23. *The Sixth South African National HIV Prevalence, Incidence, Behaviour and Communication Survey (SABSSM VI)*. Accessed September 25, 2025. https://hsrc.ac.za/special-projects/sabssm-survey-series/sabssmvi-media-pack-november-2023

24. Eaton JW, Brown T, Puckett R, et al. The Estimation and Projection Package Age-Sex Model and the r-hybrid model: new tools for estimating HIV incidence trends in sub-Saharan Africa. *AIDS*. 2019;33(Suppl 3):S235-S244. doi:10.1097/QAD.0000000000002437

25. Goga AE, Dinh TH, Essajee S, et al. What will it take for the Global Plan priority countries in Sub-Saharan Africa to eliminate mother-to-child transmission of HIV? *BMC Infect Dis*. 2019;19(S1):783. doi:10.1186/s12879-019-4393-5

26. Flor LS, Spencer CN, Cagney J, et al. Disease burden attributable to intimate partner violence against females and sexual violence against children in 204 countries and territories, 1990–2023: a systematic analysis for the Global Burden of Disease Study 2023. *The Lancet*. 2026;407(10523):31-52. doi:10.1016/S0140-6736(25)02503-6

27. Haakenstad A, Moses MW, Tao T, et al. Potential for additional government spending on HIV/AIDS in 137 low-income and middle-income countries: an economic modelling study. *The Lancet HIV*. 2019;6(6):e382-e395. doi:10.1016/S2352-3018(19)30038-4

28. Parczewski M, Gökengin D. The HIV epidemic in eastern Europe and central Asia in difficult times: a story of resilience and change. *J Int AIDS Soc*. 2024;27(Suppl 3):e26325. doi:10.1002/jia2.26325

29. Meyer-Rath G, Imai-Eaton JW. Optimising HIV spending in eastern Europe and central Asia. *The Lancet HIV*. 2024;11(10):e654-e655. doi:10.1016/S2352-3018(24)00237-6

30. European Centre for Disease Prevention and Control, World Health Organization. *HIV/AIDS Surveillance in Europe 2022 : 2021 Data*. European Centre for Disease Prevention and Control; 2022. Accessed September 29, 2025. https://data.europa.eu/doi/10.2900/818446

31. Ten Brink DC, Bowring AL, Martin-Hughes R, et al. Optimising HIV spending in 12 eastern European and central Asian countries: a modelling study. *The Lancet HIV*. 2024;11(10):e690-e699. doi:10.1016/S2352-3018(24)00188-7

32. Piñeirúa A, Sierra-Madero J, Cahn P, et al. The HIV care continuum in Latin America: challenges and opportunities. *The Lancet Infectious Diseases*. 2015;15(7):833-839. doi:10.1016/S1473-3099(15)00108-5

33. Crabtree-Ramírez B, Belaunzarán-Zamudio PF, Cortes CP, et al. The HIV epidemic in Latin America: a time to reflect on the history of success and the challenges ahead. *Journal of the International AIDS Society*. 2020;23(3):e25468. doi:10.1002/jia2.25468

34. Carriquiry G, Fink V, Koethe JR, et al. Mortality and loss to follow-up among HIV-infected persons on long-term antiretroviral therapy in Latin America and the Caribbean. *J Int AIDS Soc*. 2015;18(1):20016. doi:10.7448/IAS.18.1.20016

35. Hegdahl HK, Fylkesnes KM, Sandøy IF. Sex Differences in HIV Prevalence Persist over Time: Evidence from 18 Countries in Sub-Saharan Africa. Faragher EB, ed. *PLoS ONE*. 2016;11(2):e0148502. doi:10.1371/journal.pone.0148502

36. Kuchukhidze S, Panagiotoglou D, Boily MC, et al. Characteristics of male perpetrators of intimate partner violence and implications for women's HIV status: A pooled analysis of cohabiting couples from 27 countries in Africa (2000–2020). *PLOS Global Public Health*. 2023;3(9):e0002146. doi:10.1371/journal.pgph.0002146

37. El-Bassel N, Mukherjee TI, Stoicescu C, et al. Intertwined epidemics: progress, gaps, and opportunities to address intimate partner violence and HIV among key populations of women. *Lancet HIV*. 2022;9(3):e202-e213. doi:10.1016/S2352-3018(21)00325-8

38. Sardinha L, Maheu-Giroux M, Stöckl H, Meyer SR, García-Moreno C. Global, regional, and national prevalence estimates of physical or sexual, or both, intimate partner violence against women in 2018. *The Lancet*. 2022;399(10327):803-813. doi:10.1016/S0140-6736(21)02664-7

39. Jolley E, Rhodes T, Platt L, et al. HIV among people who inject drugs in Central and Eastern Europe and Central Asia: a systematic review with implications for policy. *BMJ Open*. 2012;2(5):e001465. doi:10.1136/bmjopen-2012-001465

40. Stover J, Sonneveldt E, Tam Y, et al. Effects of reductions in US foreign assistance on HIV, tuberculosis, family planning, and maternal and child health: a modelling study. *The Lancet Global Health*. 2025;13(10):e1669-e1680. doi:10.1016/S2214-109X(25)00281-5

41. Cavalcanti DM, De Oliveira Ferreira De Sales L, Da Silva AF, et al. Evaluating the impact of two decades of USAID interventions and projecting the effects of defunding on mortality up to 2030: a retrospective impact evaluation and forecasting analysis. *The Lancet*. 2025;406(10500):283-294. doi:10.1016/S0140-6736(25)01186-9

42. Global HIV & AIDS statistics — Fact sheet | UNAIDS. Accessed October 28, 2025. https://www.unaids.org/en/resources/fact-sheet

43. Saul J, Bachman G, Allen S, Toiv NF, Cooney C, Beamon T. The DREAMS core package of interventions: A comprehensive approach to preventing HIV among adolescent girls

and young women. *PLoS One*. 2018;13(12):e0208167. doi:10.1371/journal.pone.0208167

44. Matanje B, Masha RL, Rwibasira G, et al. The global HIV response at a crossroads: protecting gains and advancing sustainability amid funding disruptions. *The Lancet HIV*. 2025;12(7):e532-e536. doi:10.1016/S2352-3018(25)00106-7

45. Kuchukhidze S, Walters MK, Panagiotoglou D, et al. The contribution of intimate partner violence to vertical HIV transmission: a modelling analysis of 46 African countries. *The Lancet HIV*. 2024;11(8):e542-e551. doi:10.1016/S2352-3018(24)00148-6

46. Sardinha L, Maheu-Giroux M, Stöckl H, Meyer SR, García-Moreno C. Global, regional, and national prevalence estimates of physical or sexual, or both, intimate partner violence against women in 2018. *The Lancet*. 2022;399(10327):803-813. doi:10.1016/S0140-6736(21)02664-7

47. Cullen C. Method Matters: The Underreporting of Intimate Partner Violence. *The World Bank Economic Review*. 2023;37(1):49-73. doi:10.1093/wber/lhac022

48. Buller AM, Devries KM, Howard LM, Bacchus LJ. Associations between Intimate Partner Violence and Health among Men Who Have Sex with Men: A Systematic Review and Meta-Analysis. *PLOS Medicine*. 2014;11(3):e1001609. doi:10.1371/journal.pmed.1001609

49. Brennan J, Kuhns LM, Johnson AK, Belzer M, Wilson EC, Garofalo R. Syndemic Theory and HIV-Related Risk Among Young Transgender Women: The Role of Multiple, Co-Occurring Health Problems and Social Marginalization. *Am J Public Health*. 2012;102(9):1751-1757. doi:10.2105/AJPH.2011.300433

50. US Department of State. America First Global Health Strategy.

51. Morrison JS, Gostin LO. Promise and gaps in America First strategy for global health. *BMJ*. 2025;391:r2088. doi:10.1136/bmj.r2088

52. Tracking universal health coverage 2023 global monitoring report. *global monitoring report*. Published online 2023.

53. Sales JM, Swartzendruber A, Phillips AL. Trauma-Informed HIV Prevention and Treatment. *Curr HIV/AIDS Rep*. 2016;13(6):374-382. doi:10.1007/s11904-016-0337-5

54. Miani C, Wandschneider L, Niemann J, Batram-Zantvoort S, Razum O. Measurement of gender as a social determinant of health in epidemiology—A scoping review. *PLoS One*. 2021;16(11):e0259223. doi:10.1371/journal.pone.0259223

731 55. Morgan R, Kalbarczyk A, Decker M, et al. Gender-responsive monitoring and evaluation
732 for health systems. *Health Policy Plan*. 2024;39(9):1000-1005.
733 doi:10.1093/heapol/czae073

734