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

*GBD 2023 HIV Collaborators**

Summary

Background Despite a general improvement in the HIV burden over the past two decades, gendered social determinants including intimate partner violence (IPV) continue to affect women's vulnerability to HIV, which could be further exacerbated as resources dwindle over the coming years. Our study aimed to quantify recent trends in the HIV burden, the magnitude of the HIV burden associated with IPV, and the potential impact of declining financial support globally.

Methods Using the Global Burden of Diseases, Injuries, and Risk Factors Study (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 according to the availability and completeness of HIV prevalence and mortality data, with tailored modelling approaches applied for each group. To characterise the potential contributions of IPV to the HIV burden, time series estimates of IPV prevalence by location and effect size estimates were combined to generate population attributable fractions of the HIV burden. To forecast future trends and assess the potential impact of reductions in development assistance for health, we used a non-parametric stochastic frontier approach to estimate how funding levels could affect antiretroviral therapy (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, the annual number of new HIV infections declined globally, from 2·85 million (95% uncertainty interval [UI] 2·76–2·96) to 2·06 million (1·88–2·29). Meanwhile, HIV-related deaths decreased from a peak of 1·71 million (1·61–1·83) in 2004 to 0·83 million (0·73–0·96) in 2023. The number of people living with HIV rose from 26·3 million (25·5–27·3) in 2003 to 42·4 million (40·3–44·4) in 2023, reflecting improved survival associated with ART expansion. Although females continued to have higher prevalence of HIV than males in 2023 (23·4 million [22·2–24·6] *vs* 19·1 million [17·6–20·5]), the gap in incidence between females and males has substantially declined. Regionally, sub-Saharan Africa had the greatest declines in both incidence (64·3%; 58·0–68·6) and mortality (74·6%; 70·4–78·5) between 2003 and 2023, while central Europe, eastern Europe, and central Asia recorded the highest increases in incidence rates (232·1%; 146·5–299·1) and mortality rates (37·8%; 31·2–45·5) during this period. IPV was associated with an estimated 10·7% (1·6–20·4) of HIV-related deaths among females aged 15 years and older globally in 2023, corresponding to 40 700 (6400–80 600) deaths, with the highest population attributable fractions observed in Oceania (17·4%; 2·8–33·1), central sub-Saharan Africa (14·2%; 2·1–29·4), and eastern sub-Saharan Africa (13·2%; 2·0–25·3). Forecasts indicate that funding reductions could decrease ART coverage by 8·1% globally between 2025 and 2030, resulting in approximately 1·6 million new HIV infections among females and 1·3 million new HIV infections among males, alongside 790 600 and 670 600 HIV-related 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 gendered social determinants and funding stability. The potential contribution of IPV to HIV-related 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 the gains achieved and the urgent need to protect HIV financing. Achieving and sustaining the UNAIDS 2030 targets will require renewed investment, gender-responsive programming, and resilient health systems capable of providing equitable access to care.

Funding Gates Foundation and the US National Institute of Allergy and Infectious Diseases.

Lancet HIV 2026

Published Online
August 18, 2026
https://doi.org/10.1016/S2352-3018(26)00147-5

*Collaborators listed at the end of the Article

Correspondence to:
Dr Austin Carter, Institute for Health Metrics and Evaluation, University of Washington
Seattle, WA 98195, USA
aucarter@uw.edu

Copyright © 2026 Elsevier Ltd. All rights reserved, including those for text and data mining, AI training, and similar technologies.

Introduction

Global data suggest that the numbers of incident HIV cases and HIV-related 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, where HIV service uptake and viral load suppression have increased more rapidly for women than men.[4] Nonetheless, women, particularly in high-burden regions such as sub-Saharan Africa, 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]

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 using the search string "(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 from database inception up to Sept 30, 2025. This search yielded six studies, most of which were limited to national or subnational analyses; only one reported population attributable fractions for HIV mortality, and none provided global estimates. We also searched PubMed using the search string "(HIV AND ("funding cuts"[tiab:~1] OR "funding reductions"[tiab:~1] OR "funding reduction"[tiab:~1]))", focusing on studies published between Jan 1, 2025, and Sept 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, ten Brink and colleagues modelled deaths in 26 low-income and middle-income countries (LMICs) and extrapolated that an estimated 0·77–2·93 million additional HIV-related deaths would occur 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. Second, Stover and colleagues estimated between 1·6 million and 6·6 million additional HIV-related deaths across 55 countries. This search also identified a review 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 effects of funding cuts on HIV mortality that includes a global estimate.

Added value of this study

New data on HIV prevalence, incidence, and mortality were incorporated into this round of GBD estimates. Additionally, 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 to 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, using sex-disaggregated data as a proxy for women's exposure. Additionally, 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 up to 2030. The study's comprehensive modelling allows cross-regional comparisons, quantifies the scale of the association of IPV with HIV burden, and identifies how financial contraction could reverse decades of progress, especially for women.

Implications of all the 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 crucial role of gender-based violence in shaping the epidemic. Importantly, by integrating new analyses of anticipated losses in antiretroviral therapy coverage resulting from recent funding reductions, our forecasts of sex-disaggregated HIV incidence and mortality can help inform policy makers responding to funding challenges. Previous evidence suggests that countries were making substantial progress towards UNAIDS 2030 targets for reducing HIV incidence and mortality. Our forecasts indicate that the recent funding cuts will undermine this progress, with a greater impact for women, and particularly in sub-Saharan Africa. At the same time, the rising HIV incidence and mortality rates in central and eastern Europe and central Asia could intensify. Restoring funding and implementing robust measures to protect women from IPV will be essential to prevent the erosion of two decades of gains.

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 an 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 (ART) as 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 ART adherence disruptions could lead to increased rates of virological failure and subsequent mortality. Understanding these gendered dynamics within the broader HIV epidemic could provide important context for anticipating how broader policy shifts, such as recent funding reductions, could 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 ART for millions of people living with HIV 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 programmes in 2026,[15] it is anticipated that by 2030 there will be a substantial reduction or reversal of progress in the global response to HIV.[16,17] This reduction is likely to 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 UN report found that funding cuts had resulted in suspension or termination, or both, of more than a third of surveyed civil society and women's right organisations working to end violence against women.[19] For example, PEPFAR-funded initiatives such as the Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe (DREAMS) programme, which sought to directly address the structural drivers of increased HIV risk in adolescent girls and young women, including gender-based violence, have already faced severe disruptions.[20]

In this study, we aimed to report on the global burden of HIV with a specific focus on the burden attributable to IPV in women. Specifically, we used results from the Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2023 for the years 2003 to 2023 to systematically assess progress made in HIV incidence and mortality for 204 countries and territories over the past two decades. We also estimated the percentage of HIV-related deaths and HIV-related disability-adjusted life-years (DALYs) among women that were attributable to the independent effects of IPV. Last, we examined 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 Article aims to provide a multi-scalar perspective on the complexity and fragility of the progress made in the fight against HIV. This analysis was conducted as part of the GBD Collaborator Network, adhering to the standardised GBD protocol.

Methods

Overview

For GBD 2023, we generated annual estimates of the HIV burden from 1990 to 2023 for 204 countries and territories, spanning both sexes and all ages from birth to age 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 applied in GBD 2023 for HIV assessment. Geographical results are presented by the seven GBD super-regions: central Europe, eastern Europe, and central Asia; high income; Latin America and the Caribbean; north Africa and the Middle East; south Asia; southeast Asia, east Asia, and Oceania; and sub-Saharan Africa (appendix 1 p 5).

See Online for appendix 1

Input data and modelling strategy

To optimise estimation accuracy, countries and territories were categorised on the basis of 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 did not have 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 of GBD estimates, and the completeness of vital registration systems (appendix 1 p 4).

For Group 1 locations, we used 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.[2,22] In EPP-ASM, the time-varying transmission rate, r(t), is applied at each one tenth of a year to the susceptible and infectious populations; r represents the number of new cases expected to emanate per year from an adult aged 15–49 years with untreated HIV infection.

Group 2 countries and territories were modelled by inputting exogenous estimated HIV incidence trends into a custom in-house simulation of the standard 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 were available, we jointly leveraged EPP-ASM and Spectrum to calibrate estimates to age-disaggregated and sex-disaggregated prevalence surveys and SRS data. The SRS data were used to inform the age and sex distribution of HIV incidence. Additionally, we modified the prior distribution for the transmission rate for India to better reflect the comparatively lower magnitude of the epidemic compared to countries in sub-Saharan Africa for which EPP-ASM parameter prior distributions were initially developed.[23]

Country-specific data on intervention coverage reported to UNAIDS, such as ART and prevention of vertical transmission, were incorporated into model inputs for all locations, regardless of the selected modelling strategy.[24] 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 varies by location. Countries and territories in Group 1 used EPP-ASM to leverage 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 pp 5–6).

Intimate partner violence as a risk factor

In this Article, we define IPV against women as any lifetime prevalence of physical or sexual violence, or both, by a current or former intimate partner since age 15 years. Our analysis uses sex-disaggregated data, which might exclude trans and gender non-binary individuals. These populations are frequently under-represented or not disaggregated in the primary data sources used to build our models. Although IPV affects all genders, our current estimates are constrained by the availability of data that can be incorporated into meta-analyses for these specific subgroups. Given these constraints, throughout this Article we use the terms female and male when reporting estimates in the results, and switch to the terms women, men, girls, and boys when interpreting those estimates in their social context. Additionally, we distinguished IPV (defined as occurring since age 15 years) from violence occurring earlier in life, which is modelled as a separate risk factor (child sexual abuse) within the GBD framework due to its distinct causal pathways.

We assumed a causal relationship between IPV and HIV acquisition based on well established evidence.[10,25] This link is mediated through both direct biological pathways (eg, increased transmission risk during forced sex due to vaginal trauma) and indirect behavioural and structural pathways (eg, reduced agency to negotiate condom use, partner non-monogamy, and other risks).[6] Our model specifically quantified the increased risk of HIV acquisition due to IPV. To characterise the contributions of IPV to the HIV burden in 2023, we generated time series estimates of the IPV prevalence by location and relative risk of HIV acquisition among females exposed to IPV compared to those not exposed. Because IPV affects incidence whereas risk factor impacts are measured in terms of mortality and disability, attributable fractions for prevalence and deaths were generated with cohort-specific cumulative incidence as an approximation of prevalence (appendix 1 pp 16–22). A uniform global relative risk for HIV acquisition attributable to IPV was derived from our meta-regression—Bayesian, regularised, trimmed (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 estimation assumes that the proportion of mortality attributable to IPV is proportional to the cumulative incidence of IPV-related infections over time. Although IPV also affects 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 ensured the mortality population attributable fraction (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 represented a continuation of recent trends, projecting ART coverage based on the observed rate of change between 2018 and 2023. We then developed a funding-cut scenario that included funding cuts across all donor countries, and modified these projections based on the historical relationship between HIV-specific health spending and treatment coverage.

Using a non-parametric stochastic frontier approach,[26] we modelled how changes in total HIV spending—comprising both domestic and international sources—affect ART access across 134 low-income 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. Furthermore, we assumed uniform clinical efficacy across all locations. 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 summarised as the relative change in ART coverage, additional new HIV infections, and additional HIV-related deaths (see appendix 1 pp 23–24 for more details).

GBD research and reporting practices

This research complies with the Guidelines for Accurate and Transparent Health Estimates Reporting (GATHER) statement[27] and a GATHER checklist is provided in appendix 1 (p 25); all relevant data and code are available upon request (requests should be directed to engage@healthdata.org). The University of Washington Institutional Review Board approved the GBD study (STUDY00009060) up to June 29, 2027. Count data and funding cut counts are presented to

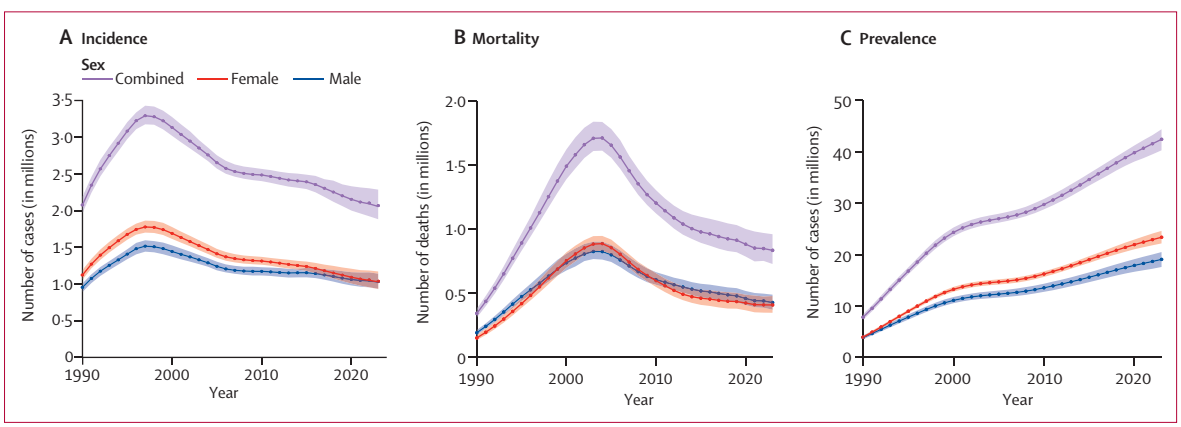
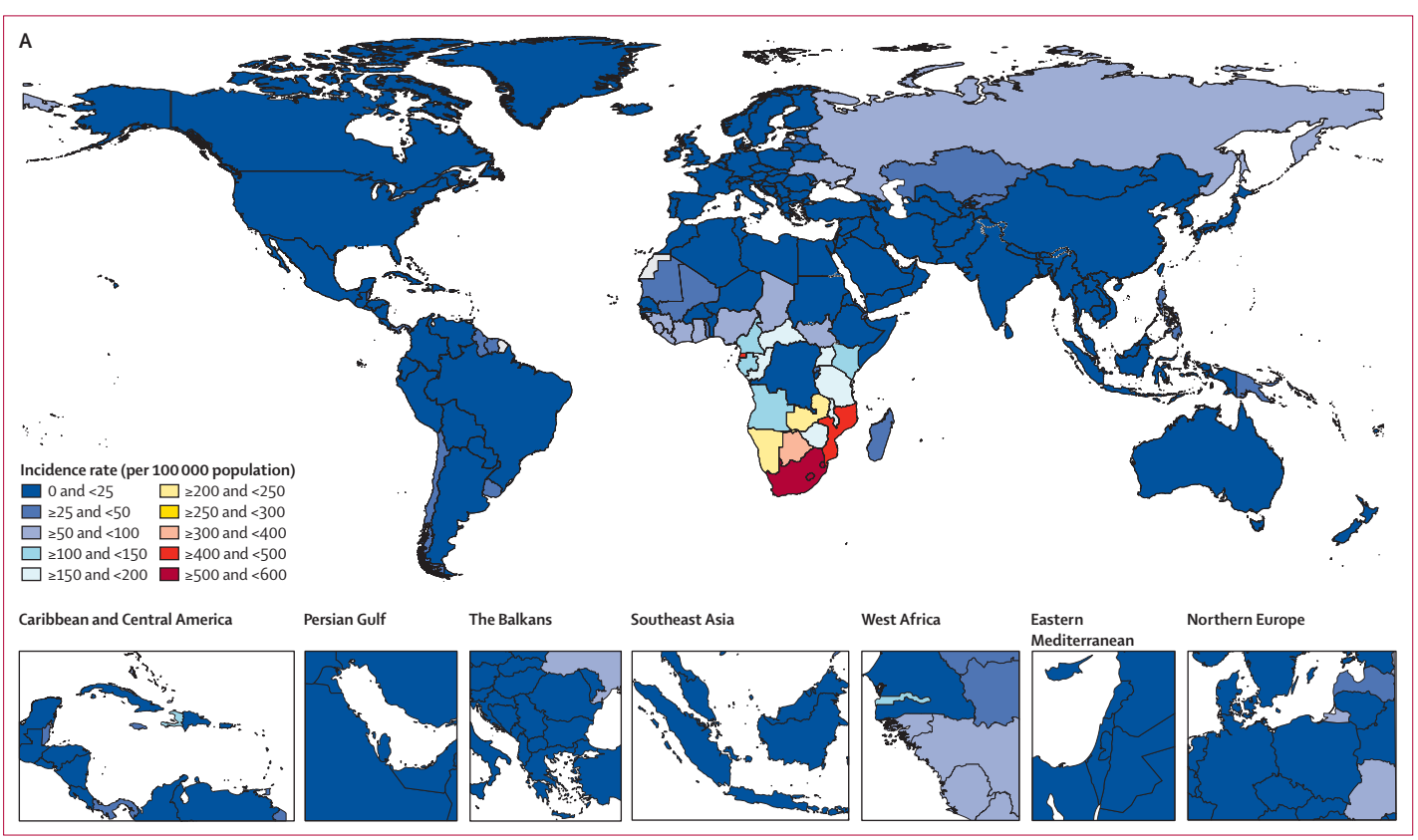


Figure 1: **Temporal trends in HIV incidence, mortality, and prevalence counts for 1990–2023**
Shaded areas represent 95% uncertainty intervals.



(Figure 2 continues on next page)

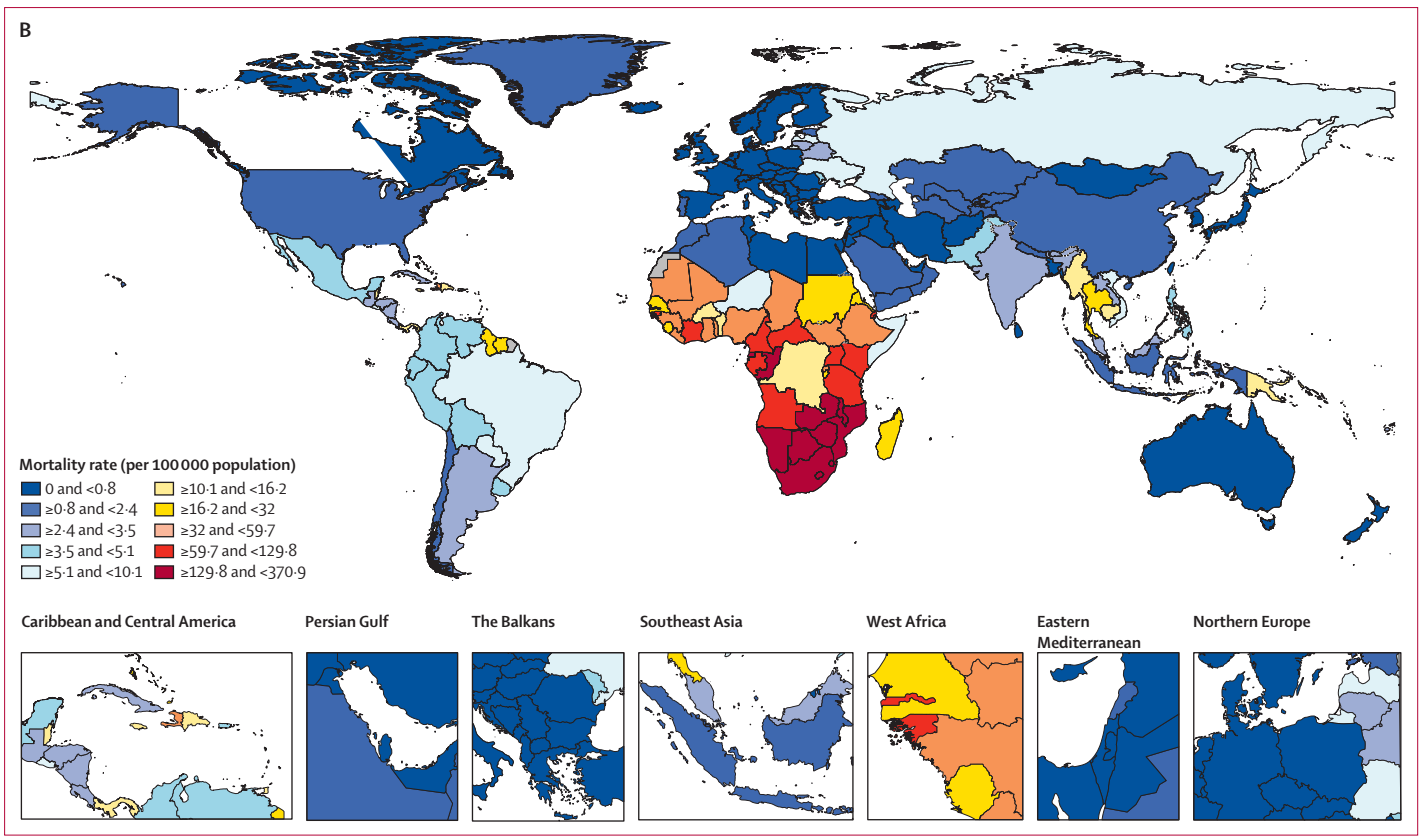


Figure 2: **Age-standardised HIV incidence (A) and mortality (B) rates for both sexes combined in 2023**
The grey areas indicate areas where no estimates are available (Western Sahara, French Guiana, and Svalbard), as these were not modelled locations in the Global Burden of Diseases, Injuries, and Risk Factors Study 2023.

three significant figures and rates are reported to 1 decimal place.

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 of this manuscript.

Results

In 2023, an estimated 42·4 million (95% uncertainty interval [UI] 40·3–44·4) people were living with HIV, compared to 26·3 million (25·5–27·3) in 2003 (figure 1). Over the past two decades (2003–23), the annual number of new HIV infections gradually declined, from 2·85 million (2·76–2·96) in 2003 to 2·06 million (1·88–2·29) in 2023. By contrast, deaths initially peaked in 2004, at 1·71 million (1·61–1·83), and declined to 0·83 million (0·73–0·96) in 2023, reaching a plateau in recent years (figure 1). 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 (figure 1). Although recent evidence has highlighted that the sex differences in incident cases have narrowed in recent years,[2] females still made up a greater number of prevalent cases compared to males; of the people living with HIV in 2023, 19·1 million (17·6–20·5) were male and 23·4 million (22·2–24·6) were female.

See Online for appendix 2

Geographically, countries in sub-Saharan Africa had the highest age-standardised HIV incidence rate and mortality rate in 2023, followed by countries in central Europe, eastern Europe, and central Asia and countries in Latin America and the Caribbean (figure 2). Within sub-Saharan Africa, Lesotho had the highest age-standardised incidence rate (587·5 [95% UI 330·7–932·5] per 100 000) and the highest age-standardised mortality rate (370·9 [296·9–460·1] per 100 000; figure 2; appendix 2 table S1). Within central Europe, eastern Europe, and central Asia, Ukraine had the highest age-standardised incidence rate (98·7 [95% UI 70·1–143·9] per 100 000) and the highest age-standardised mortality rate (10·1 [8·3–11·6] per 100 000; figure 2; appendix 2 table S1). Within Latin America and the Caribbean, Haiti had the highest age-standardised incidence rate (134·0 [80·4–221·4] per 100 000) and age-standardised mortality rate (55·8 [40·7–77·5] per 100 000; figure 2; appendix 2 table S1).

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 rates (64·3%; 95% UI 58·0–68·6) and mortality rates (74·6%; 70·4–78·5) in sub-Saharan Africa (figure 3). Leading the region's progress, Burkina Faso had a 92·4% (95% UI 86·9–95·8) reduction in HIV incidence rate and a 91·1% (87·9–94·1) reduction in mortality rate (appendix 2 table S1). Conversely, between 2003 and 2023, we saw the largest increases in HIV incidence rates (232·1%; 146·5–299·1) and mortality rates (37·8%; 31·2–45·5) in central Europe, eastern Europe, and central Asia. In this super-region, Russia had the highest increase in HIV incidence rate (371·0% [232·6–509·7]) and mortality rate (83·7% [75·8–93·1]; appendix 2 table S1). A smaller increase in the HIV incidence rate was seen in Latin America and the Caribbean (figure 3).

In 2023, the global PAF of HIV-related deaths associated with IPV for females aged 15 years and older was 10·7% (95% UI 1·6–20·4) corresponding to 40 700 (6400–80 600) deaths. Among all regions, Oceania, central sub-Saharan Africa, and eastern sub-Saharan Africa had the highest PAFs of HIV-related deaths associated with IPV in 2023 (figure 4). In Oceania, the PAF of HIV-related deaths associated with IPV for females was 17·4% (95% UI 2·8–33·1), corresponding to 115 HIV-related deaths (19·5–251; appendix 2 table S2, figure S4). In central sub-Saharan Africa, approximately 14·2% (2·1–29·4) of HIV-related deaths among females were associated with IPV in 2023, corresponding to 3660 HIV-related deaths (544–7630; appendix 2, table S2, figure S4). Finally, in eastern sub-Saharan Africa, approximately 13·2% (2·0–25·3) of HIV-related deaths among females were associated with IPV in 2023, corresponding to 15 100 HIV-related deaths (2320–29 800; appendix 2, table S2, figure S4). The proportion of the disease burden measured in DALYs that was associated with IPV followed similar patterns (appendix 2 figure S4). 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 was 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 was primarily driven by the wide variation in local IPV exposure (appendix 2 table S3).

The table 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-related deaths among females compared to 1·0 million new infections and 611 800 HIV-related deaths among males between 2025 and 2030.

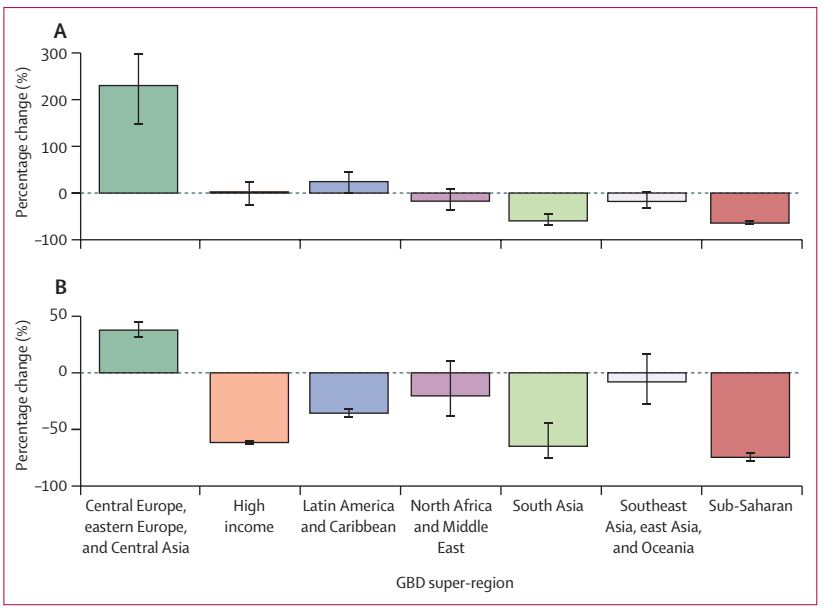


Figure 3: **Percentage change in incidence (A) and mortality rates (B), stratified by GBD super-region, between 2003 and 2023**
Error bars represent 95% uncertainty intervals. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

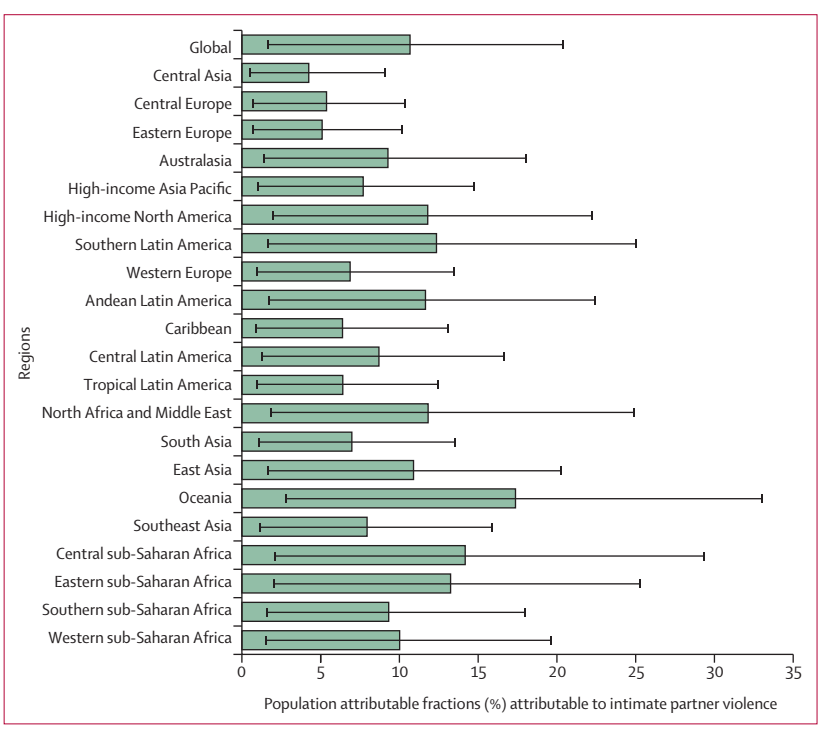


Figure 4: **Population attributable fractions of HIV-related deaths due to intimate partner violence among HIV-positive females aged 15 years and older, by GBD region, 2023**
Error bars represent 95% uncertainty intervals. GBD=Global Burden of Diseases, Injuries, and Risk Factors Study.

	Funding cut (in millions of 2023 US$)	Percent relative change in ART coverage (%)	Cumulative increase in female new HIV infections	Cumulative increase in male new HIV infections	Cumulative increase in female HIV deaths	Cumulative increase in male HIV deaths
Sudan	−494·5	−66·9%	16 700	14 100	23 000	14 400
Somalia	−332·8	−29·6%	4100	3500	4200	3600
Mozambique	−2331·6	−29·1%	547 400	409 500	134 600	109 400
Burundi	−445·8	−27·6%	10 500	8300	11 000	9500
The Gambia	−190·7	−23·2%	8300	6300	3700	3100
South Sudan	−778·9	−22·4%	7700	5600	2600	2300
Cameroon	−874·3	−22·1%	96 300	66 600	65 500	43 200
Chad	−406·0	−22·0%	26 100	20 400	9000	7800
Malawi	−1238·6	−20·0%	46 100	31 100	53 500	46 300
Guinea-Bissau	−121·1	−19·6%	6200	4900	4800	3400
Sub-Saharan Africa	−40 406·2	−10·2%	1 433 000	1 039 700	733 900	611 800
Global	−60 166·8	−8·1%	1 559 700	1 272 600	790 600	670 600

ART=antiretroviral therapy.

Table: **Impact of funding cuts on ART coverage, new HIV infections, and HIV-related deaths 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-related deaths among females. Within sub-Saharan Africa, countries that will see the largest declines in ART coverage are Somalia, Mozambique, Burundi, The Gambia, South Sudan, Cameroon, Chad, Malawi, and Guinea-Bissau. Mozambique is expected to see the greatest increase in 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-related deaths among females.

Discussion

Over the past two decades, mortality rates among people living with HIV 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 HIV incidence and mortality globally, although this region is also responsible for the greatest reductions in incidence and mortality rates over the past two decades. By contrast, HIV incidence and mortality rates in central Europe, eastern Europe, and central Asia have increased by 232·1% and 37·8%, respectively. Although 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 that 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-related 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 on 2023 estimates. 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 in sub-Saharan Africa.

Our findings of rising HIV incidence and mortality rates in central Europe, eastern Europe, and central Asia have been previously documented.[28,29] Among other factors, 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 might have overtaken unsafe injection as the route of transmission of most new HIV 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 of 12 countries in eastern Europe and central Asia found that prioritising ART and programmes for key populations in the region could avert 32% of new HIV infections and 27% of HIV-related deaths by 2030 alone.[31] The observed variations in subregional trends in the region might be influenced by, among other factors, differences in surveillance infrastructure and reporting transparency. For example, in Russia, legal and social barriers that disenfranchise key populations could lead to considerable under-reporting and lower testing coverage.[32]

In Latin America and the Caribbean, the observed increase in HIV incidence rates and stagnation in HIV-related mortality rates in some countries stands in stark contrast to the progress seen in sub-Saharan Africa.

Recent reports have also highlighted this stagnation in mortality rates and increases in incidence rates in Latin America and the Caribbean.[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.[33] 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 the levels of engagement in continuous care that are required for viral load suppression.[34,35]

For years, sex differences in HIV incidence have been observed.[2] The closing of the sex difference in HIV incidence might reflect important advances in reducing risk among women. However, evidence suggests that women, on average, acquire HIV as much as 5–7 years earlier than men.[36] There are various explanations for this difference, including women's higher biological susceptibility to HIV and sexually transmitted infections than men and age discrepancy in relationships. Women's age discrepancies in relationships can put them at increased risk for gender-based violence such as IPV, which in turn puts them at risk for HIV acquisition.[37] 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 an increased risk of HIV acquisition and creates barriers to HIV prevention, testing, treatment, and care.[10,38] The high PAFs for IPV in Oceania are driven by the high prevalence of IPV in the region. A 2018 study estimating IPV against women found high rates of lifetime and past-year IPV across Oceania.[39] For example, in Melanesia (Fiji, Papua New Guinea, Solomon Islands, and Vanuatu), the study found that 51% of women reported ever experiencing IPV and 30% reported past-year IPV. By contrast, the small PAFs for IPV in central Europe, eastern Europe, and central Asia are consistent with estimates of IPV prevalence in this region. Moreover, previous findings have emphasised that the key risk in this region might be unsafe injection practices[40] 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 prevention and management of 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-related deaths, particularly among women, and particularly in sub-Saharan Africa, by 2030. Although 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,[26] our findings suggest that the largest decrease in ART coverage would come from countries that rely heavily on external funding. For example, Burundi, Cameroon, The Gambia, Guinea-Bissau, Malawi, Mozambique, and South Sudan all finance more than 80% of their HIV care and treatment spending with development assistance.[26] 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.[31,41] For example, Stover and colleagues[41] estimated that complete cessation of US funding would result in an additional 4·1 million (range 1·6–6·6) AIDS-related deaths between 2025 and 2030. Because our funding cuts 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 governments and partners, agencies such as the US Agency for International Development (USAID) helped ensure these funds reached the intended programmes. 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.[42] 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 people living with HIV knew their HIV status, 89% of those diagnosed received ART, and 94% were virally suppressed, reflecting steady but incomplete progress towards these goals.[43] Moreover, the effects of funding cuts on ART coverage and subsequent infections and mortality will not be felt equally across the population and instead could 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 a 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 increased violence, making them particularly vulnerable to HIV.[5] The anticipated withdrawal of PEPFAR-funded initiatives such as DREAMS,[44] 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 adolescent girls and young women.

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.[45] 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 that development assistance contributes towards HIV/AIDS care and treatment.[26] 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 US$18 billion and that other development assistance remains similar to 2020–22.[14]

In this update to GBD estimates, adjustments to our mortality estimation process had several effects on our analyses. 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 it 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, but IPV exists 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. One particular complex factor is the potential for bidirectional causality, where HIV-positive status might itself increase the risk of IPV exposure, which is a limitation that could not be disentangled in this GBD analysis.[46] 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 could be exposed to multiple risk factors over time, and that various factors, including biomedical factors such as viral load suppression, can also affect mortality. The clinical progression pathway remains an important area for future modelling. Similarly, because our model focuses on the direct acquisition of HIV, it also does not capture the indirect burden mediated through subsequent engagement in unsafe sex following IPV. Furthermore, because 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.[47] 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 scarce.[39,48] Although our modelling is designed to minimise bias, geographical 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. Our reliance on self-reported data could lead to bias due to, among other factors, regional variations in survey methodology and willingness to disclose IPV exposure.

Furthermore, our modelling approach used a single, uniform global relative risk for HIV acquisition. Although we acknowledge that the social, legal, and cultural contexts of IPV vary considerably across regions, there are currently insufficient longitudinal data to justify the parameterisation of location-specific relative risks. Consequently, our estimated relative risk might not capture regional nuances in the IPV–HIV relationship, although it represents, to our knowledge, the most robust synthesis of existing longitudinal evidence via our MR-BRT meta-analysis framework. This global estimate differs from recent pooled analyses such as those presented by Kuchukhidze and colleagues[9] due to fundamental differences in temporal framing. Although Kuchukhidze and colleagues[9] used past-year IPV to predict recent HIV infection, our model used 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.

Third, the impact of IPV on HIV outcomes in men was not modelled due to the scarcity of high-quality longitudinal data. However, cross-sectional data have

found an association between IPV and HIV in men, specifically men who have sex with men.[49] Relatedly, effect sizes for gender-diverse individuals are scarce despite evidence of an association between IPV and HIV in these groups.[50] Fourth, more granular data are also needed to differentiate the 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. Fifth, because many data sources focus exclusively on marital or cohabitating relationships, our estimates might not fully capture the risks associated with violence in other relationships.

Finally, there is considerable uncertainty in the estimated effects of funding cuts. Our model assumed a uniform efficacy of ART when in practice the effectiveness of ART can vary due to regional differences in health-care infrastructure, patient adherence initiatives, and various other social factors.[51] Moreover, in our analysis, we assumed that declines in ART coverage would be the sole driver of changes in HIV incidence and mortality. However, funding reductions could affect 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 under-represents 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 probably try to reallocate available resources, or that other non-US donors could help fill funding gaps. Moreover, our estimates do not account for changes in the aid strategy of the USA 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.[52] Under these compacts, the USA would increase aid for frontline workers and commodities, including ART, and require countries to plan for eventual aid discontinuation.[53] Implementation of these compacts would mean our results might overestimate the impact of future declines in ART coverage and HIV incidence and mortality. Finally, while our modelling approach uses the same EPP–ASM and Spectrum simulation frameworks as UNAIDS, we modified the input data and model parameters. By incorporating these internal GBD parameters and using tailored country-level data for calibration, we ensured that our HIV estimates are fully consistent with GBD's global demographic and cause-of-death assessments. Consequently, although 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 the HIV burden at both the global and regional level by combining new data with various methodological advances while presenting novel results. We are the first to present global numbers of the association between IPV and HIV, combining results from a systematic review on the relationship between IPV and HIV with our GBD estimates of the HIV burden. These results shine a spotlight on one of the many complex factors that contribute to continued transmission of HIV. Additionally, we combined 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 the future HIV burden. Although 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 UN 2030 Agenda for Sustainable Development, which calls for the commitment of countries to provide universal health coverage,[54] 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 that incorporate intentional efforts to acknowledge and address IPV could help reduce HIV risk.[55] For example, situating trauma-informed sexual health services, including HIV prevention programmes, within settings that serve individuals who have experienced IPV might be an effective strategy for preventing HIV among this population. Additionally, advocating for interventions that address the interconnected economic and safety needs of IPV survivors could help empower these individuals to negotiate safer sex and increase their engagement with HIV prevention and care services.[8] Finally, gender is a key social determinant of health,[56] 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.[57] Integrating HIV care into national health financing mechanisms and advancing gender-responsive health systems are essential steps towards building resilient primary-care systems that are capable of achieving equitable and sustainable health outcomes.

GBD 2023 HIV Collaborators

Austin Carter*, Meixin Zhang*, Bricia G Trejo*, Megan Verma, Edmond D Brewer, Dylan Lasher, Jiawei He, Regina-Mae Villanueva Dominguez, Amanda Movo, Jianing Ma, Olivia Angelino, Hans J Elliott, Carolyn M Shyong, Ian E Cogswell, Abdullah, Hasan Aalruz, Mulatu Abageda, Ukachukwu O Abaraogu, Qamar Abbas, Samar Abd ElHafeez, Ashraf Nabiel Abdalla, Emad M Abdallah, Reda Abdel-Hameed, Siddig Ibrahim Abdelwahab, Wakgari Mosisa Abdisa, Meriem Abdoun, Arman Abdous, Jeza Muhamad Abdul Aziz, Rizwan Suliankatchi Abdulkader, Adam Abdullahi, Auwal Abdullahi, Abdulrakib Abdulrahim, Toufik Abdul-Rahman, Sadik Abdulwehab, Meklit Girma Abebe, Melese Shenkut Abebe, Tesfaye Birhanu Abebe, Yonas Tarefa Abebe, Roberto Ariel Abeldaño Zuñiga, Yirgalem Abere, Syed Hani Abidi, Alemwork Abie, Olifan Zewdie Abil, Olumide Abiodun, Richard Gyan Aboagye, Shady Abohashem, Abdullahi Tunde Aborode, Moaz Elsayed Abouelmagd, Nagah M Abourashed, Lucas Guimarães Abreu, Amr Selim Abu Lila, Mohammad A Abu Sabra, Fuad Hamdi A Abuadas, Mohammad H Abuadas, Aminu Kende Abubakar, Ibrahim Banaru Abubakar, Rana Kamal Abu-Farha, Eman Abu-Gharbieh, Sawsan Abuhammad, Ahmad Y Abuhelwa, Hana J Abukhadijah, Mohammad S Abu-Mahfouz, Niveen ME Abu-Rmeileh, Dina Abushanab, Ahmed Abu-Zaid, Anirudh Balakrishna Acharya, Apurba Acharya, Swetha Acharya, Chewan Acharya Sharma, Meshack Achore, Amira Elfadil Adam, Aishah Fadila Adamu, Nuhu Lawan Adamu, Yau Adamu, Isaac Yeboah Addo, Oluwafemi Atanda Adeagbo, Tajudeen Adesanmi Adebisi, Babatope Oluwadamilare Adebiyi, Ayo Stephen Adebowale, Kamoru Ademola Adedokun, Nurudeen A Adegoke, Victor Adekanmbi, Dhikroh Oriyomi Adekola, Saheed Ayodeji Adekola, Olumide Thomas Adeleke, Makinde Adebayo Adeniyi, Adekola George Adepoju, Daniel Adeyemi Adepoju, Charles Oluwaseun Adetunji, Juliana Bunmi Adetunji, Habeeb Omoponle Adewuyi, Usha Adiga, Olufemi Timothy Adigun, Molalign Aligaz Adisu, Belete Muluadam Admassie, Mohd Adnan, Qorinah Estiningtyas Sakilah Adnani, Prince Owusu Adoma, Obed Adonteng-Kissi, Aanuoluwapo Adeyimika Afolabi, Oyeyemi Adebayo Afolabi, Vlad-Adrian Afrăsânie, Fatemeh Afrashteh, Ebenezer Afrifa-Yamoah, Muhammad Sohail Afzal, Saira Afzal, Gizachew Beykaso Agafari, Zeleke Dutamo Agde, Feleke Doyore Agide, Percival Delali Agordoh, Williams Agyemang-Duah, Aqeel Ahmad, Hassan Yusif Ahmad, Irfan Ahmad, Khurshid Ahmad, Muayyad M Ahmad, Naved Ahmad, Rabbiya Ahmad, Saheem Ahmad, Sajjad Ahmad, Suhaib Ahmad, Tauseef Ahmad, Ali Ahmed, Ayman Ahmed, Gasha Salih Ahmed, Haroon Ahmed, Junaid Ahmed, Mehrunnisha Sharif Ahmed, Mohamed Sherif Ali Ahmed, Mohammed Ahmed, Muktar Beshir Ahmed, Naveed Ahmed, Saif Ahmed, Shahzaib Ahmed, Syed Anees Ahmed, Aanuoluwatimileyin Ajayi, Kobi V Ajayi, Damola Olanipekun Ajisafe, Oluwabusayomi O Akeju, Oluwasefunmi Akeju, Roland Eghoghosoa Akhigbe, Akil Akhtar, Muhammad Nadeem Akhtar, Mohsina Akhter, Oladipo Vincent Akinmade, Karolina Akinosoglou, Damilare Michael Akintunde, Tosin Yinka Akintunde, Yagiz Matthew Akiska, Wole Akosile, Alaa Al Amiry, Salah Al Awaidy, Khalid Awad Al Kubaisi, Duaa Fayiz Al Maghaireh, Yazan Al Thaher, Omar Ali Mohammed Al Zaabi, Mohammad Ahmmad Mahmoud Al Zoubi, Muaaz M Alajlani, Khurshid Alam, Mohammad Saquib Alam, Mohammad Khursheed Alam, Mohammad Jahoor Alam, Nazmul Alam, Rasmieh Mustafa Al-Amer, Fahad Mashhour Alanezi, Turki M Alanzi, Abdullah Alarifi, Fahmi Y Al-Ashwal, Mohammed Albashtawy, Mohammad T AlBataineh, MS Sultan Al-Buriahi, Bezawit Abeje Alemayehu, Embay Amare Alemseged, Hailemaryam Alemu, Melaku Birhanu Alemu, Ali M Alfalki, Fahad D Algahtani, Abdelazeem M Algammal, Abdullah Mesfer A Alghamdi, Fadwa Naji Alhalaiqa, Amidu Alhassan, Robert Kaba Alhassan, Amjad Ali, Haider Ali, Inayat Ali, Irfan Ali, Mohammad Daud Ali, Mohammed Usman Ali, Nemat Ali, Syed Shujait Ali, Montaha Al-Iede, Sheikh Mohammad Alif, Esubalew Muluneh Aligaz, Hamid Alinejad Rokny, Morteza Alipour, Mohammed Alissa, Mamman Aliyu Na'uzo, Alaa A A Aljabali, Samah W Al-Jabi, Moath Saleh Aljohani, Syed Mohamed Aljunid, Sameer Abdulmalik Alkubati, Khaled S Allemailem, Wesam Taher Almagharbeh, Sabah Al-Marwani, Ahmad Abdulaziz Almatroudi, Joseph Uy Almazan, Hesham M Al-Mekhlafi, Khalid Almugheed, Mohmmad Minwer Alnaeem, Khaldoon Aied Alnawafleh, Hasan Yaser Alniss, Margret Beaula Alocious Sukumar, Ahmad Rajeh Al-Qudimat, Mousa Alreshidi, Intima Alrimawi, Sahel Majed Alrousan, Mohammed Amjed Alsaegh, Bandar Sulaiman Alsaif, Najim Z Alshahrani, Ali Salman Al-Shami, Mamdouh Alshammari, Yazed Saleh Alsowaida, Zaid Altaany, Awais Altaf, Kassaye D Demeke Altaye, Malik A Althobiani, Diala Altwalbeh, Nelson Alvis-Guzman, Yaser Mohammed Al-Worafi, Hany Aly, Karem H Alzoubi, Adel S Al-Zubairi, Joy Amafah, Priscilla O Ameh, Faten Amer, Tarek Tawfik Amin, Kafayat Aminu, Sohrab Amiri, Ayodeji Amobonye, Kazeem Olanrewaju Olanrewaju Amoo, Hubert Amu, Ganiyu Adeniyi Amusa, Jimoh Amzat, Prosper Junior Anatsui, Etsay Woldu Anbesu, Song Peng Ang, Ebuka Miracle Anieto, Abhishek Anil, AH Sruthi Anil Kumar, Prapti Anjana, Abdul-Azeez Adeyemi Anjorin, Kabilan Annadurai, Reindolf Anokye, Abebe Alemu Anshebo, Boluwatife Stephen Anuoluwa, Sadaf Anwar, Saleha Anwar, Razique Anwer, Anayochukwu Edward Anyasodor, Walter Appati, Melika Arab Bafrani Arab Bafrani, Jalal Arabloo, Aleksandr Y Aravkin, Irfan Ardani, Demelash Areda, Brhane Berhe Aregawi, Abdulfatai Aremu, Olatunde Aremu, Jorge Arias de la Torre, Keivan Armani, Benedetta Armocida, Danilo Arnone, Mahwish Arooj, Santhosh Arul, Nurila Aryntayeva, Nabiy Arystan, Syed Mohammed Basheeruddin Asdaq, Ashraf M Ashmawy, Syed Amir Ashraf, Tahira Ashraf, Bernard Kwadwo Yeboah Asiamah-Asare, Olamide Asifat, Moses Asiimwe, Tsehay Aslake, Muhammad Shahzad Aslam, Yuni Asri, Ashagre Molla Assaye, Batyrbek Assembekov, Seyyed Shamsadin Athari, Samuel Babajide Atoyebi, Alok Atreya, Abadi Hailay Atsbaha, Julie Alaere Atta, Zeenah A Atwan, Matteo Augello, Avinash Aujayeb, Zaw Zaw Aung, Khursheed Aurangzeb, Leticia Avila-Burgos, Usman Ayub Awan, Amlaku Mulat Aweke, Kemal Lemnuro Awol, Adedapo Wasiu Awotidebe, Beatriz Paulina Ayala Quintanilla, Brhane Ayele, Habtamu Molla Ayele, Michael F Ayenew, Damilola Jeremiah Ayowole, AKM Azad, Arian Azadnia, Alireza Azarboo, Ayman Azhary, Farya Azimi, Mohd Yusmaidie Aziz, Ahmed Y Azzam, Domenico Azzolino, Djibril M Ba, Zaharaddeen Shuaibu Babandi, Prasad Hanmantrao Babar, Israel Tadesse Bacha, Tomasz Bączek, Abebe Sorsa Badacho, Muhammad Badar, Ashish D Badiye, Alaa Aboelnour Badran, Khlood K Baghlaf, Atif Amin Baig, Mirza Mohammad Ali Baig, Alpha Umaru Bai-Sesay, Ahmed Hassan Bakheit, Mohamad Amin Bakhshali, Mohamed Ibrahem Baklola, Pachamuthu Balakrishnan, Senthilkumar Balakrishnan, Wondu Feyisa Feyisa Balcha, Yatan Pal Singh Balhara, Jose Balmori-de-la-Miyar, Olaitan Johnson Balogun, Mohammadreza Balooch Hasankhani, Kiran Bam, Samuel Alemu Bamboro, Maciej Banach, Altaf Bandy, Simachew Animen Bante, Aleksandra Barac, Sanaa Bardaweel, Dennis Bardoe, Suzanne Lyn Barker-Collo, Hiba Jawdat Barqawi, Amadou Barrow, MD Abu Bashar, Zarrin Basharat, Shahid Bashir, Azadeh Bashiri, Jawad Basit, Rehana Basri, Armel Landry Batchi-Bouyou, Shazia Batool, Kavita Batra, Samuel Debas Debas Bayable, Zemenu Wube Bayleyegn, Abdulrahman S Bazaid, Neeraj Bedi, Narasimha M Beeraka, Marzia Bejo Torchio, Azmeraw Bekele, Bezawit K Bekele,

Firomsa Bekele, Almaz Nibret Belay, Bekalu Mekonen Belay, Samir Bele, Michelle L Bell, Muhammad Bashir Bello, Apostolos Beloukas, Samiun Nazrin Bente Kamal Tune, Kenechukwu C Ben-Umeh, Kelemu Zelalem Berhanu, Efrem Shushay Berhe, Alemshet Yirga Berhie, Abiye Assefa Berihun, Robert S Bernstein, Anmut Endalkachew Bezie, Ajeet Singh Bhadoria, Neeraj Bhala, Jeetendra Bhandari, Anuradha Bhardwaj, Nikha Bhardwaj, Pankaj Bhardwaj, Sonu Bhaskar, Shahnawaz Ali Bhat, Arushee Bhatnagar, Sudip Bhattacharya, Ashmin Hari Bhattarai, Gurjit Kaur Bhatti, Jasvinder Singh Bhatti, Md Mehedi Hasan Bhuiyan, Zulfiqar A Bhutta, Sibhatu Kassa Biadgilign, Tilahun Yemanu Birhan, Eshetie Melese Birru, Bijit Biswas, Deepayan Biswas, Mohammad Shahangir Biswas, Monirujjaman Biswas, Getaye Tizazu Biwota, Mary Sefa Boampong, Trupti Bodhare, Lucimere Bohn, Damilola Bolanle, Obasanjo Afolabi Bolarinwa, Archith Boloor, Samuel Adolf Bosoka, Alejandro Botero Carvajal, Souad Bouaoud, Christopher Boxe, Enrique Bravo-García, Gabrielle Britton, Colin Stewart Brown, Michael Eric Bryan, Sayed Muhammad Ata Ullah Shah Bukhari, Norma B Bulamu, Tsion Samuel Bunare, Akeem Olayinka Busari, Felix Busch, Yasser Bustanji, Zahid A Butt, Sanjay C J, Jack Cagney, Lucero Cahuana-Hurtado, Mehtap Çakmak Barsbay, Julio Cesar Campuzano Rincon, Zhong Cao, Angelo Capodici, Rosario Cárdenas, Andrea Carugno, Andre F Carvalho, Felix Carvalho, Sandra Carvalho, Giulio Castelpietra, Luca Cegolon, Achille Cernigliaro, Sonia Cerrai, Pamela Roxana Chacón-Uscamaita, Chiranjib Chakraborty, Sandip Chakraborty, Sanjoy Kumar Chanda, Rama Mohan Chandika, Miyuru Chandradasa, Vijay Kumar Chattu, Lam Duc Chau, Anis Ahmad Chaudhary, Sirshendu Chaudhuri, Akhilanand Chaurasia, Snehal Prakash Chavhan, Daniel Alemayehu Chekol, Fentahun Alemnew Chekole, Haiyan Chen, Hana Chen, Haowei Chen, Junhao Chen, Meng Xuan Chen, Nicholas WS Chew, Ruixin Chi, Patrick R Ching, Jesus Lorenzo Chirinos-Caceres, William C S Cho, Bryan Chong, Hitesh Chopra, Shivani Chopra, Mirza Farhana Iqbal Chowdhury, Mohiuddin Ahsanul Kabir Chowdhury, Devasahayam J Christopher, Dinh-Toi Chu, Isaac Sunday Chukwu, Stephen Chukwudeh, Eric Chung, Sunghyun Chung, Samuele Cortese, Claudia Cosma, Natalia Cruz-Martins, Silvia Magali Cuadra-Hernández, Omid Dadras, Ephrem Mebratu Dagnew, Gizachew Worku Dagnew, Hana Mahdi Dahir, Neha Dahiya, Xiaochen Dai, Emanuele D'Amico, Endalamaw Tesfa Damtie, Lalit Dandona, Rakhi Dandona, Suleiman Danladi, Pojsakorn Danpanichkul, Samuel Demissie Darcho, Latefa Ali Dardas, Tracy Antwiwaa Darfour, Aso Mohammad Darwesh, Sayan Kumar Das, José das Neves, Nihar Ranjan Dash, Dhruva Dave, Elham Davoudi, Aprill Z Dawson, Fernando Pio De la Hoz, Diego De Leo, Aninda Debnath, Sindhura Deekonda, Louisa Degenhardt, Ivan Delgado-Enciso, Berihun Assefa Demissie, Tadios Niguss Derese, Emina Dervišević, Don C Des Jarlais, Keshab Deuba, Vinoth Gnana Chellaiyan Devanbu, Pradeep Kumar Devarakonda, Thiyagarajan Devasena, Devananda Devegowda, Syed Masudur Rahman Dewan, Arkadeep Dhali, Amol S Dhane, Redolen Rose Rose Dhar, Sreedhar Dharmagadda, Kimia Didehvar, Elmes Saoussene Dif, Misbahud Din, Dereje Chala Diriba, Huy Duc Do, Mai Ngoc Do, Thao Huynh Phuong Do, Sushil Dohare, David Mawutor Donkor, Ojas Prakashbhai Doshi, Robert Kokou Dowou, Eleonora Dubljanin, Abebe Dukessa, Emeka W Dumbili, Aster Dure Dumbullo, Jennifer Dunne, Oyewole Christopher Durojaiye, Siddhartha Dutta, Basil Barth Duwa, Bismark Dwumfour-Asare, Osamudiamen Ebohon, Ejemai Eboreime, Venkata Ravikanth Eddula, Hisham Atan Edinur, Kristina Edvardsson, Yohannes Tekalegn Efa, Aziz Eftekharimehrabad, Terje Andreas Eikemo, El-Sayed Hemdan Hemdan Eissa, Moaheda EH Eissa, Balisa Mosisa Ejeta, Martin Herbas Ekat, Michael Ekholuenetale, Seraphine Mojoko Eko, Adebayo Abdulateef Ekundayo, Rabie Adel El Arab, Ibrahim Farahat El Bayoumy, Maysaa El Sayed Zaki, Amine Elbouzidi, Ahmed Eldaboush, Muhammed Elhadi, Yasir Ahmed Mohammed Elhadi, Mohamed Elhoumed, Salem Elkahoui, Omar Abdelsadek Abdou Elmeligy, Ashraf A El-Metwally, Mohamed Hassan Elnaem, Gihan ELNahas, Abdallah Elssir Ahmed, Abdelgawad Salah Eltahawy, Mohamed El-Tholoth, Munachimso Anthony Emesobum, Simachew Getaneh Endalamew, Stanley Chinedu Eneh, Tariku Laelago Ersado, Deborah Tolulope Esan, Sharareh Eskandarieh, Collins Nduka Esomchi, Werku Etafa, Mengistu Ewunetu, Oghenowede Eyawo, Peter Maduabuchi Eze, Sayeh Ezzikouri, Adeniyi Francis Fagbamigbe, Ayesha Fahim, Ildar Ravisovich Fakhradiyev, Ebenezer Gezahegn Fanta, Abdullah Farasani, Mohammad Fareed, Aisha Farhana, Zaki Farhana, Andre Faro, Syed Muhammad Yousaf Farooq, Wafa Fatima, Nelsensius Klau Fauk, Gelana Fekadu, Ginenus Fekadu, Feten Fekih-Romdhane, Ulrich Membe Femoe, Pietro Ferrara, Nuno Ferreira, Getahun Fetensa, Bikila Regassa Feyisa, Kebede Feyisa, Tommaso Filippini, Luca Fiorillo, Florian Fischer, Federica Fogacci, Sunkanmi Folorunsho, Marco Fonzo, Alina-Ioana Forray, Evelyn Foster-Pagaebi, Paolo Fusar-Poli, Adam Fusheini, Muktar A Gadanya, Dominic Dormenyo Gadeka, Mário Gajdács, Adamu Usman Gamawa, Dhanraj Ganapathy, Balasankar Ganesan, Balasubramanian Ganesh, Shivaprakash Gangachannaiah, Dingwei Gao, Fernando Jr Barroga Garcia, Chandi Garg, Jacopo Garlasco, Nirmal Gautam, Rupesh K Gautam, Dr Yemane Gebremariam Gebre, Tsion S Gebre, Haftay Gebremedhin, Beza A Gelaw, Miesa Gelchu, Getahun Belay Gella, Kabiru Ishola Genty, Mebin George Mathew, Ali Gerami Matin, Hailay Abrha Gesesew, Genanew K Getahun, Kalab Yigermal Gete, Tigist Wubet Gezahegn, Keyghobad Ghadiri, Manal Hadi Ghaffoori Kanaan, Roya Ghafoury, Arin Ghamkhar, Lobna Gharaibeh, Mohammad-Reza Ghasemi, Amany Abdelkader Ghazy Ghazy, Ramy Mohamed Ghazy, Sama Ghoba, Ehsan Gholami, Ali Gholamrezanezhad, Artyom Urievich Gil, Syed Abdullah Gilani, Syed Amir Gilani, Bikash Ranjan Giri, Soliyana Gizachew, Vincent Uwumboriyhie Gmayinaam, Kimiya Gohari, Gamze Gökulu, Mahaveer Golechha, Ruofan Gongye, Yitayal Ayalew Goshu, Ayman Grada, Shi-Yang Guan, Giovanni Guarducci, Amit Gulati, Kabiru Abubakar Gulma, Damitha Asanga Gunawardane, Aayush Gupta, Himanshu Gupta, Sapna Gupta, Swati Gupta, Roberth Steven Gutiérrez-Murillo, Jose Guzman-Esquivel, Eduardo Guzmán-Muñoz, Abrham Tesfaye Habteyes, Awoke Derbie Habteyohannes, Nguyen Hai Nam, Addisalem Haile, Michael Tamene Haile, Yohannes Gebreegziabher Haile, Kirubel Tesfaye Hailu, Nooh Mohamed Hajhamed, Ramtin Hajibeygi, Esam Halboub, Pritam Halder, Souheil Hallit, Raz Mohammed Hama Salih, Islam M Hamad, Fatimah Othman Hamarasoo, Nadia M Hamdy, Bara M Hammadeh, Ashiru Mohammad Hamza, Didem Han Yekdeş, Asif Hanif, Harapan Harapan, Arief Hargono, Josep Maria Haro, Sara Harsini, Ahmed I Hasaballah, Abd Alhadi Hasan, Md Kamrul Hasan, Ali Hasanpour- Dehkordi, Abdul Haseeb, Arezou Hashem Zadeh, Mohammad Hashem Hashempur, Md Saquib Hasnain, Ibrahim Nagmeldin Hassan, Ikrama Hassan, Md Imtaiyaz Hassan, Mohamed Said Hassan, Omed Hassan Ahmed, Mohammad Heidari, Kamran Heydaryan, Kamal Hezam, Hagos Degefa Hidru, Takhona G Hlatshwako, Mbuzeleni Hlongwa, Ramesh Holla, Mazeda Hossain, Md Moyazzem Hossain, Md Sabbir Hossain, Mohammad Bellal Hossain, Syed Billal Hossain, Mehdi Hosseinzadeh, Sorin Hostiuc, Mohamed Hsairi, Mila Nu Nu Htay, Yifei Hu, Junjie Huang, Yongsong Huang, Mega Hasanul Huda, Meseret Hulualem Hulualem, Waqar Husain, Kiavash Hushmandi, Javid Hussain, M Azhar Hussain, MD Talib Hussain, Dursa Hussein, Mohammed Asif Hussein, Nawfal R Hussein, Mohamed Ibrahim Husseiny, Olayemi Joshua Ibidoja, Olabisi Fatimo Ibitoye, Segun Emmanuel Ibitoye, Aminu Alhassan Ibrahim, Umar Idris Ibrahim, Anel Ibrayeva, Opeyemi Idowu, Mukhtar Ijaiya, Adalia Ikiroma, Aqsa Ikram, Jibran Ikram, Olayinka Stephen Ilesanmi, Irena M Ilic, Salim Ilyasu, Mohammad Tarique Imam, Lucius Chidiebere Imoh, Mohd Imran, Danish Iqbal, Meesha Iqbal, Mujahid Iqbal, Usman Iqbal, Bilal Irfan, Lalu Muhammad Irham, Mustafa Alhaji Isa, Teresa R Iskander, Md Mojahedul Islam, Md Rabiul Islam, Md Sahidul Islam, Md Saiful Islam, Md Shahinul Islam, Nahlah Elkudssiah Ismail, Aloysia Ispriantari, Yussif Issaka, Hiroshi Ito, Chidozie Declan Iwu, Chinwe Juliana Iwu-Jaja, Oshozimhede E Iyalomhe, Ihoghosa Osamuyi Iyamu, Shadi Izadidehkordi,

Juan S Izquierdo-Condoy, Jaison Jacob, Mohammadsadegh Jafari, Shabbar Jaffar, Haitham Jahrami, Ayushi Jain, Ammar Abdulrahman Jairoun, Abhishek Jaiswal, Swati Jaiswal, Mihajlo Jakovljevic, Sahbanathul Missiriya Jalal, Armaan Jamal, Arshad Jamal, Qazi Mohammad Sajid Jamal, Jazlan Jamaluddin, Jerin James, Rajiv Janardhanan, Manthan Dilipkumar Janodia, Anan S Jarab, Javad Javidnia, Talha Jawaid, Qassim Jawell Odah Abed, Sathish Kumar Jayapal, Ruwan Duminda Jayasinghe, Yovanthi Anurangi Jayasinghe, Achala Upendra Jayatilleke, Belayneh Hamdela Jena, Jae Joon Jeon, Seogsong Jeong, Fan Jiang, Wenyi Jin, Akash John, Mohammad Jokar, Tamas Joo, Jobin Jose, Akaninyene Paul Joseph, Alex Joseph, Mickael Antoine Joseph, Nitin Joseph, Charity Ehimwenma Joshua, George Vellaramcheril Joy, Jacek Jerzy Jozwiak, Hema Shree K, Billingsley Kaambwa, Ali Kabir, Dler Hussein Kadir, Mohammad Fahim Kadir, Ashish Kumar Kakkar, Khalil Kalavani, Feroze Kaliyadan, Mehnaz Kamal, Rajesh Kamath, Ramat T Kamorudeen, Hesam Kamyab, Oleksandr Kamyshnyi, Kehinde Kazeem Kanmodi, Sujitha Kannan, Suthanthira Kannan S, Rami S Kantar, Neeti Kapoor, Sonali Kar, Sunil Kumar Kar, Neila Karagezova, Paschalis Karakasis, Sajad Karampoor, Reddy Praneeth Karnam, Tomasz M Karpiński, Faizan Zaffar Kashoo, Manoj Kumar Kashyap, Assefa Andargie Kassa, Nehemia I Kassa, Eden Asmare Kassahun, Amandeep Kaur, Avleen Kaur, Stella Adejoke Kayode, Abenezer Zenebe Kebede, Adera Debella Kebede, Awoke Amare Kebede, Fekadu Abera Kebede, Yabets Tesfaye Kebede, Tibebeselassie S Keflie, Peter Njenga Keiyoro, Chukwudi Keke, John H Kempen, Yousef Saleh Khader, Inn Kynn Khaing, Himanshu Khajuria, Asaad Khalid, Anas Husam Khalifeh, Anees Ahmed Khalil, Ibrahim Khalil, Faham Khamesipour, Abida Khan, Ajmal Khan, Faiz Ullah Khan, Hafiz Nadeem Khan, Iman Waheed Khan, Iqra Hamid Khan, Kashif Ullah Khan, Maseer Khan, Md Abdullah Saeed Khan, Mohd Wajid Ali Khan, Muhammad Khan, Muhammad Arslan Khan, Muhammad Hamza Khan, Muhammad Umer Khan, Serab Khan, Sumaiya Khan, Yusuf Saleem Khan, Zahid Khan, Sameer Uttamaro Khasbage, Khaled Khatab, Ramiar Kamal Kheder, Khalid A Kheirallah, Jaewon Khil, Parisa Khoshvaght, Samira Khoshvaght, Pavan Khosla, Farbod Khosravi, Sepehr Khosravi, Jagdish Khubchandani, Azhin Mohammed Khudhur, Mohammad Khudirat, P Ratan Khuman, Hye Jun Kim, Jinho Kim, Kwanghyun Kim, Min Seo Kim, Yun Jin Kim, Ruth W Kimokoti, Adnan Kisa, Sezer Kisa, Ladli Kishore, Shivakumar KM, Sonali Kochhar, Prakash Babu Kodali, Ali-Asghar Kolahi, Farzad Kompani, Uebari Korfii, Wolyu Erkano Korma, Oleksii Korzh, Michal Koscik, Karel Kostev, Archana Koul, Parvaiz A Koul, Sindhura Lakshmi Koulmane Laxminarayana, James-Paul Kretchy, Kewal Krishan, Abhishek Krishna, Nitya Krishnasamy, Garry Kuan, Burcu Kucuk Bicer, Mohammed Kuddus, Anit Kujur, Mukhtar Kulimbet, Vishnutheertha Kulkarni, Shweta Kulshreshtha, Augustine Kumah, Emmanuel Kumah, Ashwini Kumar, Dewesh Kumar, G Anil Kumar, Jogender Kumar, Kamal Kumar, Laksh Kumar, Manasi Kumar, Nitesh Kumar, Nithin Kumar, Pawan Kumar, Pradeep Kumar, Rakesh Kumar, Sandeep Kumar, Sanjay Kirshan Kumar, Sumit Kumar, Subramanian Kumaran, Sajeetha Kumari R, Jibin Kunjavara, Maria Dyah Kurniasari, Donata Kurpas, Pramod Kumar Kushawaha, Christina Yeni Kustanti, Dian Kusuma, Assylkhan Kuttybayev, John Paul Kuwornu, Mavis Pearl Kwabla, Taeho Kwak, Ville Kytö, Pallavi L C, Carlo La Vecchia, Desireé Alexa LaGrappe, Chandrakant Lahariya, Daphne Teck Ching Lai, Hanpeng Lai, Timo Lajunen, Balzhan Lakanova, Dharmesh Kumar Lal, Berthold Langguth, Tamás Lantos, Yilma Markos Larebo, Savita Lasrado, Zohra S Lassi, Saheed Akinmayowa Lawal, Aliyu Lawan, Eilean Rathinasamy Lazarus, Thao Thi Thu Le, Hayeon Lee, Hoi Leong Lee, Munjae Lee, Ryung Lee, Sergey Vadimovich Lee, Seung Won Lee, Wei-Chen Lee, Vasileios Leivaditis, Dawit Alemu Lemma, Jimma Likisa Lenjisa, Bati Leta, Ming-Chieh Li, Xiaopan Li, Zhengrui Li, Yanxue Lian, Virendra S Ligade, Liangquan Lin, Gang Liu, Xianliang Liu, Xinghan Liu, Xuefeng Liu, Tewachew Muche Liyeh, Erand Llanaj, Madeeha Shahzad Lodhi, Bruno Silvester Lopes, Luís Carlos Lopes-Júnior, Andrés López-Cortés, José Francisco López-Gil, Arianna Maever Loreche, Surbala Devi Lourembam, Jailos Lubinda, Peng Luo, Pincheng Luo, Angelina M Lutambi, Hengliang Lv, Lei Lv, Ellina Lytvyak, Kevin Sheng-Kai Ma, Zheng Feei Ma, Raymond Saa-Eru Maalman, Shamsuddeen Yusuf Ma'aruf, Monika Machoy-Rakoczy, Máté Mackei, Farzan Madadizadeh, Pasquale Maffia, Larissa Silva Magalhães, Azzam A Maghazachi, Edward Augustine Magwe, Melani Ratih Mahanani, Nozad Hussein Mahmood, Mansour Adam Mahmoud, Ghaseb Naser Makhadmeh, Hardeep Singh Malhotra, Shahid Malik, Tabarak Malik, Lesibana Anthony Malinga, Birhanemaskal Malkamu, Trisha Mallick, Deborah Carvalho Malta, Muhammad Talha Maniya, Lokesh Manjani, Kamaruddeen Mannethodi, Diego Manríquez-Robles, Mohammad Ali Mansournia, Iqra Manzoor, Shaista Manzoor, Tahir Maqbool, Kaleem Maqsood, Hamid Reza Marateb, Joemer C Maravilla, Ulunma Ikwuoma Mariere, Bernardo Alfonso Martinez-Guerra, Francisco Rogerlândio Martins-Melo, Miquel Martorell, Roy Rillera Marzo, Sammer Marzouk, Hossein Masoumi-Asl, Yasith Mathangasinghe, Medha Mathur, Neeta Mathur, Khurshid A Mattoo, Richard James Maude, Sidik Maulana, Suleiman Mayaki, Prosanjit Mazumder, Steven M McPhail, John Robert Carabeo Medina, Medhin Mehari, Kedar Gautambhai Mehta, Vini Mehta, Subhash Mehto, Addisu Melese, Ziad Ahmed Memish, Aamir Raoof Memon, Ricardo Méndez-Molina, Walter Mendoza, Ritesh G Menezes, Berihun Agegn Mengistie, Emiru Ayalew Mengistie, Tara P Menon, Anusha Sultan Meo, Michelangelo Mercogliano, Tuomo J Meretoja, Muayad Aghali Merza, Rahwa Adisu Mesfin, Tomislav Mestrovic, Nicholas Metheny, Mohamed M M Metwally, Sandrine Donfack D Mewoabi, Peter Meylakhs, Turnwait Otu Michael, Irmina Maria Michalek, Andrea Michelerio, Awoke Mihretu, Ted R Miller, Giuseppe Minervini, Long Chiau Ming, Mojgan Mirghafourvand, Seyed Ali Mirshahvalad, Vinaytosh Mishra, Arup Kumar Misra, Tridip Mitra, Chaitanya Mittal, Babak Moazen, Dhruti Modi, Abdalla Z Mohamed, Farduus Ibraahim Mohamed, Mona Gamal Mohamed, Nouh Saad Mohamed, Khabab Abbasher Hussien Mohamed Ahmed, Taj Mohammad, Mohammad Reza Mohammadi, Saeed Mohammadi, Hussen Mohammed, Mustapha Mohammed, Omer Mohammed, Shafiu Mohammed, Suleiman Mohammed, Yahaya Mohammed, Zaidan Mohammed, Yugal Kishore Mohanta, Ranjan Kumar Mohapatra, Afrasim Moin, Ali H Mokdad, Hirbaye Mokona, Sabrina Molinaro, Lorenzo Monasta, Himel Mondal, Yousef Moradi, Paula Moraga, Luis A Morales Ojeda, Rafael Silveira Moreira, Mahdis Morovvati, Shane Douglas Morrison, Mahmoud M Morsy, Reza Mosaddeghi Heris, Md Shihab Mostafa, Rohith Motappa, Amin Mousavi Khaneghah, Mohamed Awad Abdalaziz Mousnad, Hagar L Mowafy, Emmanuel A Mpolya, Matías Mrejen, Ahmed Msherghi, Steward Mudenda, Shiv Kumar Mudgal, Jibran Sualeh Muhammad, Khalid Muhammad, Sileshi Mulatu, Francesk Mulita, Luqman Munir, Mehnaz Munir, Malaisamy Muniyandi, Kavita Munjal, Scherko Hama Law Murad, BV Murlimanju, Krishna Murti, Sani Musa, Ezekiel Musasizi, Abdisalam Hassan Muse, Yahye Hassan Muse, Saima Mushtaq, David Musoke, Adam Mustapha, Saravanan Muthupandian, Claude Mambo Muvunyi, Woojae Myung, Ahamarshan Jayaraman Nagarajan, Karikalan Nagarajan, Dhayanithi Nagarajan Balachandran, Firzan Nainu, Sanjeev Nair, Ibrahim A Naqid, Abdulqadir J Nashwan, Mahmoud Nassar, Zuhair S Natto, Samidi Nirasha Kumari Navaratna, Muhammad Naveed, Biswa Prakash Nayak, Kinjal Nayak, Vinod C Nayak, G Takop Nchanji, Anthony Wainaina Ndungu, Amanuel Tebabal Nega, Nini Asfaw Asfaw Negash, Ionut Negoi, Samata Nepal, Sumaiya Nezam, Jean Claude Semuto Ngabonziza, Georges Nguefack-Tsague, Josephine W Ngunjiri, Cao Duy Nguyen, Cuong Tat Nguyen, Huong Lan Thi Nguyen, Nghia Phu Nguyen, Phat Tuan Nguyen, Tham Thi Nguyen, Thanh Van Nguyen, Minh Thien Nguyen Thien, Robina Khan Niazi, Luciano Nieddu, Afewerki Tesfahunegn Nigusse, Dina Nur Anggraini Ningrum, Stanley Nkemjika, Richmond Nketia, Princess Afia Nkrumah-Boateng, Lawrence Achilles Nnyanzi, Shuhei Nomura, Mamoona Noreen, Jean Jacques Noubiap, Emira Noumi, Mohammed Noushad, Chisom Adaobi Nri-Ezedi, Yves Jacket Nsavyimana, Jean Claude Nshimiyimana, Mpiko Ntsekhe, Fred Nugen, Atoma Negera Nugusa, Mengistu H Nunemo,

Nurfatimah Nurfatimah, Martins Nweke, Chimezie Igwegbe Nzoputam, Ogochukwu Janet Nzoputam, Saheed Adeyinka Odediji, Thomas Odeny, Ismail A Odetokun, Oluwapelumi I Odubunmi, Felix Akpojene Ogbo, Oluwakemi Christie Ogidan, Anthony Jide Ogunbadewa, Oluwafunmilayo Tosin Ogundeko-Olugbami, Tolulope R Ojo-Akosile, Debra Ukamaka Okeh, Sylvester Reuben Okeke, Akinkunmi Paul Okekunle, Promise Okereke, Olalekan John Okesanya, Ikechukwu Alex Okoli, Osaretin Christabel Okonji, Lenz Nwachinemere Okoro, Godwin Okoye, David Aduragbemi Okunlola, John Olayemi Okunlola, Oluwaseyi Isaiah Olabisi, Musa Kolapo Oladejo, Andrew T Olagunju, Folarin O Olanrewaju, Antonio Olivas-Martinez, Gláucia Maria Moraes Oliveira, Abdulhakeem Abayomi Olorukooba, Adetayo Olorunlana, Comfort Z Olorunsaiye, Ronald Olum, Olutosin Samuel Olusola, Ruth Toluwani Olusola, Ahmed Omar Bali, Moshood Olanrewaju Omotayo, Qi Chwen Ong, Sandersan Onie, Hope Onohuean, Francisca Ogochukwu Onukansi, Miracle Chinonso Oparah, Michal Ordak, Verner N Orish, Doris Verónica Ortega-Altamirano, Esteban Ortiz-Prado, Godwin Osawaru Osaigbovo, Augustus Osborne, Eric Osei, Uchechukwu Levi Osuagwu, Oche Joseph Otorkpa, Jerry John Ouner, Amel Ouyahia, Tope Oyelade, Kehinde Adewole Oyeniran, Mega Obukohwo Oyovwi, Ilker Ozsahin, Mahesh P A, Jagadish Rao Padubidri, Sathishrajaa Palaniraja, Vijayakumar Palaniswamy, Raul Felipe Palma-Alvarez, Sujogya Kumar Panda, Deepshikha Pande Katare, Apurvakumar Pandya, Georgios D Panos, Leonidas D Panos, Giovanni Paolino, Ilias Papadimopoulos, Parinaz Paranjkhoo, Amrita Parida, Romil R Parikh, Chulwoo Park, Kayoung Park, Arpit Parmar, Pragnesh Parmar, Sameena Parveen, Ava Pashaei, Maja Pasovic, Roberto Passera, Bhargav Umeshchandra Patel, Kunal Nitinkumar Patel, Meet Navinkumar Patel, Mehali Lalitbhai Patel, Mitesh Patel, Niki Rut Patel, Sangram Kishor Patel, Satyananda Patel, Shivani Patel, Shankargouda Patil, Mohamed Anas Patni, Iuliia Pavlova, Shrikant Pawar, Hamidreza Pazoki Toroudi, Flavia Pennisi, Veincent Christian Filipino Pepito, Prince Peprah, Eric Peprah Osei, Gladymar Perez Chacon, Simone Perna, Olumuyiwa James Peter, Roshni Mary Peter, Tung Thanh Pham, Zayar Phyo, David M Pigott, Julian David Pillay, Edoardo Pirera, Ramesh Poluru, Thantrira Porntaveetus, Fabio Porru, Tina Priscilla, Michal Pruc, Surabhi Puri, Jagadeesh Puvvula, Husam Qanash, Nameer Hashim Qasim, Xiang Qi, Mohammad Qodrati, Nuzul Qur'aniati, Shahazad Niwazi Qurashi, Basuki Rachmat, Raghu Anekal Radhakrishnan, Mahla Radmard, Yashpal Singh Raghav, Sheu Kadiri Rahamon, Fakher Rahim, Hawbash Mohammed-Amin Rahim, Sajjad Rahimi, Abdur Rahman, Firman Suryadi Rahman, Fryad Majeed Rahman, Mohammad Meshbahur Rahman, Mohammad Rubayat Rahman, Mosiur Rahman, Amir Masoud Rahmani, Sunil Kumar Raina, Gunaseelan Rajendran, Pushp Lata Rajpoot, Mahmoud Mohammed Ramadan, Osama Mohamed Elsayed Ramadan, Kadar Ramadhan, Chitra Ramasamy, Shakthi Kumaran Ramasamy, Kirtan Rana, Lokesh Rana, Chhabi Lal Ranabhat, Nemanja Rancic, Smitha Rani, Asad Gul Rao, Kumuda Rao, Mithun Rao, Rajath Rao, Sowmya J Rao, Rama Shankar Rath, Shree Rath, Isha Rathi, Devarajan Rathish, Santosh Kumar Rauniyar, Renju Ravi, David Laith Rawaf, Salman Rawaf, Karthik Rayapureddi, Murali Mohan Rama Krishna Reddy, Elrashdy M Redwan, Wajiha Rehman, Bhagwan Narayan Rekadwad, Stefano Restaino, Luis Felipe Reyes, Mina Rezaei, Nazila Rezaei, Nima Rezaei, Muhammad Riaz, Maria Helena Rigatto, Moattar Raza Rizvi, Syed Mohd Danish Rizvi, Jefferson Antonio Buendia Rodriguez, Leonardo Roever, Ravi Rohilla, Moustaq Karim Khan Rony, Kevin T Root, Allen Guy Patrick Ross, Himanshu Sekhar Rout, Priyanka Roy, Sharmistha Roy, Shubhanjali Roy, Rohini Ruhil, Godfrey Mutashambara Rwegerera, Devarajulu Reddy S, Aly M A Saad, Sura Saad Abdullah, Cameron John Sabet, Muhammad Saboor, Seyed Kiarash Sadat Rafiei, Muhammad Nabeel Saddique, Bassem Sadek, Mohammad Reza Saeb, Mohd Saeed, Umar Saeed, Maryam Saeedi, Mehdi Safari, Muhammad Safiullah, Rajesh Sagar, Dominic Sagoe, Ashok Kumar Sah, Fatemeh Saheb Sharif-Askari, Narjes Saheb Sharif-Askari, Amirhossein Sahebkar, Kashif Iqbal Sahibzada, Vaibhav Sahni, Ambika Sahoo, Mahesh Chandra Chandra Sahu, Sushil Kumar Kumar Sahu, Muhammad Soaib Said, Zahra Saif, S Muhammad Sajadi, Mirza Rizwan Sajid, Joseph W Sakshaug, Bukola Salami, Muhammad Zubair Saleem, Rahman Shah Zaib Saleem, Samreen Saleem, Mohamed A Saleh, Mahdi Salehi, Amr Salem, Malik Sallam, Hossein Samadi Kafil, Janmejaya Samal, Abdallah M Samy, Rama Krishna Sanjeev, Sathish Sankar, Adekunle Sanyaolu, Sivan Yegnanarayana Iyer Saraswathy, Lintang Dian Saraswati, Siddaram Shivaji Sarate, Aswini Saravanan, Mohammad Sarmadi, Gargi Sachin Sarode, Sachin C Sarode, Michele Sassano, Mukesh Kumar Sathya Narayanan, Maheswar Satpathy, Rahmat Dani Satria, Shakta Mani Satyam, Mehrdad Savabi Far, Tual Sawn Khai, Ahmed M Sayed, Art Schuermans, Durairaj Sekar, Sindhu Sekar, Chandrabose Selvaraj, Siddharthan Selvaraj, Mohammad H Semreen, Ashenafi Kibret Sendekie, Yigit Can Senol, Subramanian Senthilkumaran, Yashendra Sethi, Dina Seyedi, Allen Seylani, Ahmed Nabil Shaaban, Arash Shaban-Nejad, Muhammad Shabbir, Muhammed Shabil, Muhammad Shahab, Uzma Shahab, Shazlin Shaharudin, Muhammad Shahbaz, Amira A Shaheen, Samiah Shahid, Syed Ahsan Shahid, Syed Monowar Alam Shahid, Wajeehah Shahid, Endrit Shahini, Moyad Jamal Shahwan, Babar Tasneem Shaikh, Masood Ali Shaikh, Nafhat Shaikh, Sunder Sham, Ali Shamekh, Anas Shamsi, Alfiya Shamsutdinova, Dan Shan, Mohd Shanawaz, Mohammed Shannawaz, Nadim Sharif, Amin Sharifan, Javad Sharifi Rad, Arkansh Sharma, Avimanu Sharma, Bhoopesh Kumar Sharma, Bunty Sharma, Dolly Sharma, Kamlesh Sharma, Manoj Sharma, Ravi Kumar Sharma, Shreya Sharma, Vishal Sharma, Shamee Shastry, Ramzi Shawahna, Maryam Shayan, Blerta Shehaj, Babangida Shehu Bappah, Somia Shehzadi, Ali Sheidaei, Rekha Raghuveer Shenoy, Samendra P Sherchan, Subuhi Sherwani, Adithi Shetty, B Suresh Kumar Shetty, Mahabalesh Shetty, Premalatha K Shetty, Ranjitha S Shetty, Robert Adamu Shey, JiaHao Shi, Muhammad J A Shiddiky, Desalegn Shiferaw, Md Monir Hossain Shimul, Arun Shirali, Reza Shirkoohi, Aminu Shittu, Birhanu Feleke Shitu, Ivy Shiue, Km Shivangi, Ambreen Shoaib, Deborah Oluwaseun Shomuyiwa, Sinegugu Nosipho Shongwe, Seyed Afshin Shorofi, Bipsana Shrestha, Roman Shrestha, Sunil Shrestha, Suleiman Adeiza Shuaibu, Shah Jahan Shuvo, Nicole Remaliah Samantha Sibuyi, Negussie Boti Sidamo, Abu Bakkar Siddique, Muhammad Irfan Siddique, Arif J Siddiqui, Samra Siddiqui, Md Khaled Sifullah, Gustavo Correia Basto da Silva, Padam Prasad Simkhada, Akanksha Singh, Amit Singh, Baljinder Singh, Harmanjit Singh, Harpreet Singh, Jasvinder A Singh, Jawahar Singh, Poornima Suryanath Singh, Satwinder Singh, Shilpy Singh, Siddharth Singh, Surendra Singh, Surjit Singh, Vanshika Singh, Yadvinder Singh, Dipendra Singh Thakuri, Abhijeet Prasad Prasad Sinha, Robert Sinto, Indra Sivakumar, Mejdi Snoussi, Farrukh Sobia, Marzieh Soheili, Md Salman Sohel, Anton Sokhan, May Mohamed Sherif Soliman, Yizhe Song, Soniya Akter Sony, Aayushi Sood, Prashant Sood, Adebayo Emmanuel Sopeju, Michele Sorrentino, Anna Maria Spagnolo, Lokasani Vijaya Sree, Kannan Sridharan, Shyamkumar Sriram, Muhammad Haroon Stanikzai, Brendon Stubbs, Chen-Yang Su, Johnson Subhash, Balachandran Subramanian, Vetriselvan Subramaniyan, Meenakshi Sundari Subramaniyan Natarajan, Mu'awiyyah Babale Sufiyan, Sahabi K Sulaiman, Muritala Suleiman Odidi, Mark J M Sullman, Joshua Sumankuuro, Jing Sun, Mao-ling Sun, Suraj Sundaragiri, Thanigaivel Sundaram, Krishna Mohan Surapaneni, Jithin Surendran, Chandan Kumar Swain, Lukasz Szarpak, Rafael Tabarés-Seisdedos, Seyyed Mohammad Tabatabaei, Celine Tabche, Ramin Tabibi, Mohammad Tabish, Santosh Kumar Tadakamadla, Afework Tadele, Rebecca Tadokera, Zanan Mohammed-Ameen Taha, Alireza Tahamtan, Amir Tahavvori, Niloofar Taheri, Moslem Taheri Soodejani, Jabeen Taiba, Shima Tajabadi, Iman M Talaat, Mircea Tampa, Ching Siang Tan, Kit-Aun Tan, Mohammad Tanashat, Frank C Tanser, Tanya Tanu,

See Online for appendix 3

Ingan Ukur Tarigan, Mengistie Kassahun Tariku, Saba Tariq, Noshin Anjum Tasmi, Vivian Y Tat, Nuno Taveira, Birhan Tsegaw Taye, Aigul Yelgondiyevna Tazhiyeva, Mebrahtu G Tedla, Fanuel Alemayehu Tefera, Nebyu Lakew Tefera, Emre Tel, Tarilate Temedie-Asogwa, Mohamad-Hani Temsah, Tigist Derebe Tesfahun, Wegen Beyene Tesfamariam, Tadesse Dagget Tesfaye, Eshetu Tesfaye Tesfaye Dejen, Azimeraw Arega Tesfu, Lewegneh Wegayehu Wegayehu Tessema, Chandan Kumar Thakur, Kavumpurathu Raman Thankappan, Rekha Thapar, Muthu Thiruvengadam, Rekha Thiruvengadam, Manuel Sebastian Thomas, Nikhil Kenny Thomas, Christina S Thornton, Adebisi Musefiu Tiamiyu, Orrin F Tiberi, Jansje Henny Vera Ticoalu, Befkad Derese Derese Tilahun, Wondimagegn Tibebu Tilahun, Vikas Kumar Tiwari, Madi Tleshev, Fitsum Bekele Bekele Tolossa, Santo Imanuel Tonapa, Arole Darwin Touko, Marcos Roberto Tovani-Palone, Khai Hoan Tram, Quynh Thuy Huong Tran, Tam Quoc Minh Tran, Thang Huu Tran, Nguyen Tran Minh Duc, Vishwas Tripathi, Samuel Joseph Tromans, Quynh Xuan Nguyen Truong, Claudia Truppa, Abdul Rohim Tualeka, Mike Tuffour Amirikah, Lawrence Sena Tuglo, Biruk Shalmeno Tusa, Arooj Ul Hassan, Atta Ullah, Himayat Ullah, Riaz Ullah, Saeed Ullah, Srikanth Umakanthan, Lawan Umar, Muhammad Umar, Bhaskaran Unnikrishnan, Era Upadhyay, Jibrin Sammani Usman, Silvia Ussai, Olivier Uwishema, Dilber Uzun Ozsahin, Hande Uzunçıbuk, Rakesh V R, Asokan Govindaraj Vaithinathan, Sai Mahesh Vajjala, Zahir Vally, Raman Swathy Vaman, Joe Varghese, Pavani Varma, Nadia Machado Vasconcelos, Vishnu Priya Veeraraghavan, U Venkatesh, Baskar Venkidasamy, Giacomo Pietro Vigezzi, Simone Villa, Jorge Hugo Villafañe, Tuan Vinh, Andres Fernando Vinueza-Veloz, Gollapalle Lakshminarayanashastry Viswanatha, Giuseppe Vizzielli, Sofia Almeida von Humboldt, Theo Vos, Thinh Toan Vu, Abubakar Sadiq Wada, Henok Toga Wada, Yasir Waheed, Megha Walia, Agnes Wamuyu Wamai, Arvinder Wander, Xingxin Wang, Yanzhong Wang, Yuan-Pang Wang, Ziyue Wang, Tanveer A Wani, Ahmed Bilal Waqar, Paul R Ward, Janith Niwanthaka Warnasekara, Desalegn Desalegn Weldebrhan, Yonas Gebregziabher Weldegerima, Anggi Lukman Wicaksana, Dakshitha Praneeth Wickramasinghe, Nuwan Darshana Wickramasinghe, Angga Wilandika, Faustine Williams, Sri Winarni, Martin Wiredu Agyekum, Andrew Awuah Wireko, Gemechu Kumera Wirtu, Habtamu Milkias Wolde, Tewodros Eshete Wonde, Florence Gyembuzie Wongnaah, Minichil Chanie Worku, Nigus Kassie Worku, Felicia Wu, Jinyi Wu, Peng Wu, Shulan Wu, Zenghong Wu, Yihun Miskir Wubie, Kihinetu Gelaye Wudineh, Tadele Kassahun Wudu, Majok Wutchok, Wanqing Xie, Zhaomin Xie, Manman Xu, Site Xu, Dharmveer Yadav, Vikas Yadav, Zemenu Shiferaw Shiferaw Yadita, Saba Yahoo, Galal Yahya, Rebaz Othman Yahya, Natsuhiko Yamada, Hao Yan, Haibo Yang, Hanwen Yang, Yuichiro Yano, Laiang Yao, Mohamed A Yassin, Sanni Yaya, Pengpeng Ye, Renjulal Yesodharan, Subah Abderehim Yesuf, Thomas Kidanemariam Yewodiaw, Saber Yezli, Siyan Yi, Arzu Yiğit, Vahit Yiğit, Biksegn Asrat Asrat Yirdaw, Gebrie Kassaw Yirga, Yazachew Engida Yismaw, Ephrem Yohannes, Dong Keon Yon, Naohiro Yonemoto, Honghao Yu, Yong Yu, Suleiman Yunusa, Abdullateef Onoruoiza Yusuf, Mubashir Zafar, Nikta Zafarjafarzadeh, Syeda Takmeel Takmeel Zahra, Fathiah Zakham, Giulia Zamagni, Aurora Zanghì, Kourosh Zarea, Seema Zargar, Saad Zbiri, Mohammed G M Zeariya, Sitotaw Tesfa Zegeye, Alemu Birara Zemariam, Eyael M Zeru, Dagmawit Zewdu, Anthony Lin Zhang, Haijun Zhang, Julio Min Fei Zhang, Shun-Xian Zhang, Yue Zhang, Yunquan Zhang, Zhichang Zhang, Zhiqiang Zhang, Jianhui Zhao, Lei Zheng, Bin Zhu, Zhengyang Zhu, Zhounan Zhu, Abzal Zhumagaliuly, Magdalena Zielińska, Mohamed Ali Zoromba, Rafat Mohammad Zrieq, Akmal Zubair, Abdulhakim Mussema Zuber, Lilik Zuhriyah, Sa'ed H Zyoud, Simon I Hay, Angela Esi Apeagyei, Emmanuela Gakidou, Mohsen Naghavi, Stephen S Lim, Benn Sartorius**, Christopher J L Murray**, and Hmwe Hmwe Kyu**.

*Joint first authors

**Joint senior authors

Affiliations
For the affiliations of individual authors, please see appendix 3 (pp 10–50).

Contributors
Please see appendix 3 (pp 51–70) for more detailed information about individual author contributions to the research, divided into the following categories: managing the overall research enterprise; writing the first draft of the manuscript; primary responsibility for applying analytical methods to produce estimates; primary responsibility for seeking, cataloguing, extracting, or cleaning data; designing or coding figures and tables; providing data or critical feedback on data sources; developing methods or computational machinery; providing critical feedback on methods or results; drafting the manuscript or revising it critically for important intellectual content; and managing the estimation or publications process. 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. A Carter, M Zhang, B G Trejo, and H H Kyu had full access to the underlying data used to generate estimates presented in this article. All other authors had access to and reviewed estimates as part of the research evaluation process, which includes additional stages of formal review.

Declaration of interests
S Afzal reports support for the present manuscript from the Institute of Public Health, Lahore, Pakistan; grants or contracts from the Dean Office Institute of Public Health Lahore; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the Dean Institute of Public Health Lahore; support for attending meetings or travel, or both, from the Dean Institute of Public Health Lahore; participation on a data safety monitoring board or advisory board as a member of the Pakistan National Bioethics Committee, as a member of the institutional review board of Fatima Jinnah Medical University, as a member of the ethical review board and data monitoring board of the Institute of Public Health Lahore; in charge of Clinical Research Organization King Edward Medical University; member of the Annals of King Edward Medical University Advisory Board; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as a member of the Pakistan Higher Education Commission Research Committee, as a member of the Pakistan Medical and Dental Commission Research and Journals Committee, Pakistan National Bioethics Committee, Pakistan Society of Internal Medicine, Pakistan Association of Medical Editors, and Medical Microbiology and Infectious Diseases Society; Fellow of Leads International, Fellow of the Faculty of Public Health UK, Fellow of the College of Physicians and Surgeons Pakistan; receipt of equipment, materials, drugs, medical writing, gifts, or other services from Bergen University, Bergen, Norway, for research writing; and other financial or non-financial support from the Dean of Public Health, Institute of Public Health Lahore, Lahore, Pakistan; outside the submitted work. Ali Ahmed reports support for the present manuscript from the US National Institute of Mental Health (grant numbers RO1MH126768 and R21MH132406). M S Aslam reports the following support for the present manuscript from Xiamen University Malaysia Research Fund (XMUMRF): grant number XMUMRF/2025-C15/ITCM/0006, Project title "Therapeutic and Toxicity Evaluation of Selected Medicinal Herbs for NAFLD: Exploring the Inter-Organelle Contact Sites Modulation Theory Role", co-investigator dates January 2025–December 2027 (ongoing), internal XMUMRF research grant administered by Xiamen University Malaysia, funds disbursed to institutional research account only; no salary, honoraria, or personal payments to author; grant number XMUMRF/2023-C11/ISEM/0041, Project title "Children's Rights Education in the Early Years of Divorce: An Exploration of Adolescents' Perspectives Role", co-investigator dates January 2023–December 2025 (ongoing), internal XMUMRF research grant administered by Xiamen University Malaysia, funds disbursed to institutional research account only; no salary, honoraria, or personal payments to author; grant number XMUMRF/2026-C17/ITCM/0007, Project title "Olfactory Stimulation and Autonomic Regulation in Menstrual Disorders Role", co-investigator dates January 2026–December 2028 (ongoing), internal XMUMRF

research grant administered by Xiamen University Malaysia, funds disbursed to institutional research account only; no salary, honoraria, or personal payments to author. M L Bell reports grants or contracts from the US National Institutes of Health, Hutchinson Postdoctoral Fellowship, Health Effects Institute, Robert Wood Johnson Foundation, and Wellcome Trust Foundation, all paid to her institution; consulting fees from Clinique and Toximap; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the Colorado School of Public Health, Duke University, University of Texas, Data4Justice, Korea University, Brown University, Konkuk University Research and Management Center for Health Risk of Particulate Matter, IOP Publishing, NIH, ESF (European Science Foundation), Fonds de la Recherche Scientifique, Health and Medical Research Fund (HMRF), Harvard University, and SciQuest; support for attending meetings or travel, or both, from the Colorado School of Public Health, University of Texas, Duke University, Harvard University, *American Journal of Public Health*, Columbia University, Harvard, Community Modeling and Analysis System (CMAS) conference, *Nature* Conferences, Boston University, Konkuk University, Massachusetts Institute of Technology, National Academy of Sciences, Wellcome Trust, and University of Pennsylvania; leadership or fiduciary role in other board, society, committee, or advocacy group, paid or unpaid, from the Fifth National Climate Assessment, *Lancet* Countdown (no payment), US Environmental Protection Agency Clean Air Scientific Advisory Committee (CASAC), Johns Hopkins Environmental Health And Engineering Advisory Board (no payment), Harvard external advisory committee for training grant (no payment), and WHO Global Air Pollution and Health Technical Advisory group (no payment); outside the submitted work. A Beloukas reports grants or contracts from Gilead and GSK/ViiV; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Gilead and GSK/ViiV; and support for attending meetings or travel, or both, from Gilead and GSK/ViiV; outside the submitted work.
S Bhaskar reports grants or contracts from the Japan Society for the Promotion of Science (JSPS), Japanese Ministry of Education, Culture, Sports, Science and Technology (Grant-in-Aid for Scientific Research [KAKENHI], Grant ID 23KF0126) and JSPS and the Australian Academy of Science (JSPS International Fellowship; Grant ID P23712); payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the Japan Stroke Society (Japan) and Semey Medical University (Kazakhstan); support for attending meetings or travel, or both, from Japan Stroke Society (Japan); leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as District Chair, Diversity, Equity, Inclusion, & Belonging for Rotary District 9675 (Sydney, Australia); Chair, Founding Member and Manager for Global Health & Migration Hub Community, Global Health Hub Germany, Berlin, Germany; Editorial Board Member for *PLOS One*, *BMC Neurology*, *Frontiers in Neurology*, *Frontiers in Stroke*, *Frontiers in Public Health*, *Journal of Aging Research*, *Neurology International*, *Diagnostics*, and *BMC Medical Research Methodology*; member of the College of Reviewers, Canadian Institutes of Health Research (CIHR), Government of Canada; Director of Research for World Headache Society, Bengaluru, India; Expert Adviser/Reviewer for Cariplo Foundation, Milan, Italy; Visiting Director for National Cerebral and Cardiovascular Center, Department of Neurology, Division of Cerebrovascular Medicine and Neurology, Suita, Osaka, Japan; member of the Scientific Review Committee for Cardiff University Biobank, Cardiff, UK; Chair for Rotary Reconciliation Action Plan; and Healthcare and Medical Adviser for Japan Connect, Osaka, Japan; outside the submitted work. C S Brown reports other financial or non-financial interests doing occasional ad-hoc one-off market research advisory (no long-term engagements), on a variety of infection topics, all anonymously conducted via market research companies with no direct communication nor any knowledge of any pharmaceutical companies or products (and none specifically related to HIV over the past 3 years); outside the submitted work. N B Bulamu reports support for the present manuscript from Flinders University; and is funded by an Early Career Researcher Fellowship from Cancer Council South Australia.
S Cortese reports support for the present manuscript from the National Institute of Health and Care Research; grants or contracts from the European Research Agency; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from ACAMH (Association for Child and Adolescent Mental Health), BAP (British Association for Psychopharmacology), and Medice; support for attending meetings or travel, or both, from ACAMH, BAP, and Medice; leadership or fiduciary role in other board, society, committee or advocacy group, unpaid as Chair of the European attention-deficit hyperactivity disorder (ADHD) guidelines group, outside the submitted work. K Deuba reports grant funding from the Research Council of Norway (project number 335495), outside the submitted work. A Faro reports support for the present manuscript from the National Council for Scientific and Technological Development (CNPq, Brazil). P Fusar-Poli reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Recordati, Lundbeck, Angelini, Menarini, Sunovion, Boehringer Ingelheim, Proxymm Science, Otsuka, Gedeon Richter, and CurieBio, outside the current study. I M Ilic reports support for the present manuscript from the Ministry of Science, Technological Development and Innovation of the Republic of Serbia (number 451-03-137/2025-03/200110). N E Ismail reports leadership or fiduciary role in other board, society, committee or advocacy group, unpaid as the Bursar and Council Member, Malaysian Academy of Pharmacy and as Vice President, IT Service Management Society of Malaysia; outside the submitted work. T Joo reports support for the present manuscript from the National Research, Development and Innovation Office in Hungary (RRF-2.3.1-21-2022-00006, Data-Driven Health Division of National Laboratory for Health Security). J J Jozwiak reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Novartis, ADAMed, Amgen, Boehringer Ingelheim, Servier, and Novo Nordisc; outside the submitted work. M K Kashyap reports grants or contracts from the Indian Council of Medical Research (ICMR), New Delhi (grant number 5/13/55/2020/NCD-III); payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the Institute of Liver and Biliary Sciences, New Delhi, India, and Kuvempu University, Shimoga, Karnataka, India; patents planned, issued or pending (2023-1100-3940 [Indian patent pending] and 2023-1105-8515 [Indian patent pending]); outside the submitted work.
J H Kempen reports support for the present manuscript from Sight for Souls and from the Mass Eye and Ear Global Surgery Program; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as Board President for Sight for Souls; Stock or stock options in Betaliq and Tarsier; outside the submitted work. J Khubchandani reports grants or contracts from Merck Sharpe Dohme, the National Science Foundation, USA, and New Mexico Idea Networks of Biomedical Research Excellence (NIH P20GM103451 subgrant); support for attending meetings or travel, or both, from NATCO (The Organization for Donation and Transplant Professionals; outside the submitted work. K Krishan reports other financial or non-financial support from the UGC Centre of Advanced Study, CAS II, awarded to the Department of Anthropology, and RUSA 2.O grant awarded by the Indian Ministry of Education to Panjab University, Chandigarh, India, outside the submitted work.
M-C Li reports support for the present manuscript from the National Science and Technology Council (NSTC), Taiwan (NSTC 113-2314-B-003-002) and the Higher Education Sprout Project of National Taiwan Normal University; leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid as Technical Editor of the *Journal of the American Heart Association*, outside the submitted work. G Liu reports grants or contracts from the Al & Val Rosenstrauss Fellowship from the Rebecca L. Cooper Medical Research Foundation, outside the submitted work. B S Lopes reports grants or contracts from the Academy of Medical Sciences (NGR2\1559) and the Applied Microbiology International New Lecturer Grant; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from European Society of Clinical Microbiology and Infectious Diseases (ESCMID) global 2026 Germany and Global Initiative of Academic Networks (GIAN) programme, Indian Institute of Technology (IIT) Dhanbad, India; support for attending meetings or travel, or both, from ESCMID global 2026 Germany and GIAN programme, IIT Dhanbad, India; participation on a data safety monitoring board or advisory board with the Microbiology Society

Advisory Council and the ESCMID subgroup ESCMID Food- and Waterborne Infections Study Group (EFWISG), outside the submitted work. P Maffia reports grants or contracts from the British Heart Foundation, NextGenerationEU Piano Nazionale di Ripresa e Resilienza (PNRR), Heart Research UK, Italian Ministry of University Progetti di Rilevante Interesse Nazionale, UK Biotechnology and Biological Sciences Research Council (BBSRC) International Partnerships Funding, Scottish Founding Council, European Commission/Erasmus+, and COST (European Cooperation in Science and Technology), and an additional contract with Elsevier for services as Associate Editor of *Pharmacological Research*; leadership or fiduciary role in other board, society, committee, or advocacy group paid or unpaid as the Vice-President and Chair of the Engagement Committee for the British Pharmacological Society (BPS), Vice-Chair of the Basic and Translational Section for the International Union of Basic and Clinical Pharmacology (IUPHAR), and Chair of the Translational Research Medical Review Panel for Heart Research UK. Additionally, P Maffia is a Nucleus Member of the European Society of Cardiology (ESC) Working Group on Atherosclerosis & Vascular Biology and Cell Biology of the Heart and serves on the Executive Committee of the British Atherosclerosis Society (BAS). P Maffia is also Chair of the Publication Committee of the International Union of Immunological Societies (IUIS), and a member of the Translational Clinical Studies (TCS) Grant Panel for the Chief Scientist Office (CSO). PM serves as Co-Director of the ARUA/Guild Africa-Europe CoRE in Non-Communicable Diseases & Multimorbidity, Deputy Editor of *Cardiovascular Research*, Associate Editor of *Pharmacological Research*, and Editor-in-Chief of the Human Health Section of *Frontiers for Young Minds*; outside the submitted work. H R Marateb reports grants or contracts from Universitat Politècnica de Catalunya · Barcelona Tech – UPC, outside the submitted work. R J Maude reports support for the present manuscript from Wellcome Trust (grant number 220211) as it provides core funding for Mahidol Oxford Tropical Medicine Research and contributes to their salary. R J Maude is required by Wellcome to acknowledge this grant in all publications. P Meylakhs reports grants or contracts from the Center for Comparative Research of Social Well-being, HSE University (Grant number 2025-52), outside the submitted work. L Monasta reports support for the present manuscript from the Italian Ministry of Health (Ricerca Corrente 34/2017), and payments made to the Institute for Maternal and Child Health, IRCCS Burlo Garofolo. R S Moreira reports grants or contracts from the CNPq Research Productivity Scholarship (National Council for Scientific and Technological Development; scholarship registration number 308986/2025-3). S Nomura reports support for the present manuscript from the Ministry of Education, Culture, Sports, Science and Technology of Japan (24H00663). S Onie reports support for the present manuscript from the Lynch Family Foundation; grants or contracts from the National Health and Medical Research Centre; stock or stock options from Wellspring Center Indonesia; outside the submitted work. R F Palma-Alvarez reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Angelini, Casen Recordati, Lundbeck, Neuraxpharm, Rubió, Servier, and Takeda; and support for attending meetings or travel, or both, from Angelini, Italfarmaco, Advanz Pharma, Takeda, Lundbeck, and Camurus; outside the submitted work. S K Panda reports support for the present manuscript from Siksha 'O' Anusandhan (Deemed to be University); grants or contracts from file number 17-59/2023-24/CCRH/Tech./Coll./ICMR- Diabetes/960 as co-investigator and from file number HS/RC/393 as principal investigator, outside the submitted work. G D Panos reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Thea Greece, Bayer Greece, and Roche Hella; support for attending meetings or travel, or both, from Thea Greece, Bayer Greece, and Roche Hellas; outside the submitted work. R Passera reports participation on a data safety monitoring board or advisory board for the clinical trial "Consolidation with ADCT-402 (loncastuximab tesirine) after immunochemotherapy: a phase II study in BTKi-treated/ineligible Relapse/Refractory Mantle Cell Lymphoma (MCL) patients", Fondazione Italiana Linfomi (FIL), Alessandria (Italy); leadership or fiduciary role in other board, society, committee, or advocacy group, paid or unpaid as member of the European Society for Blood and Marrow Transplantation (EBMT) Statistical Committee, Paris (France), membership of the FIL Statistical Committee, Alessandria (Italy), and past membership (2020–23) as biostatistician of the IRB/IEC Comitato Etico AO SS Antonio e Biagio Alessandria-ASL AL-VC (Italy); outside the submitted work. V C F Pepito reports payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Zuellig Family Foundation and Philippine Ambulatory Pediatrics Association; outside the submitted work. L F Reyes reports grants or contracts from GSK, MSD, and Pfizer; consulting fees from GSK and Pfizer; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from GSK Vitalis; support for attending meetings or travel, or both, from GSK, Pfizer, and Vitalis; outside the submitted work. S Saleem reports grants or contracts from Health Services Academy, Islamabad, Pakistan; and payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events Health Services Academy, Islamabad, Pakistan; outside the submitted work. A Shaban-Nejad reports grants or contracts from the National Cancer Institute (NCI), Tennessee Department of Health, and National Institute on Minority Health and Health Disparities; consulting fees from Haleon; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the National Comprehensive Cancer Network; and support for attending meetings or travel, or both, from Haleon and the National Comprehensive Cancer Network; outside the submitted work. V Sharma reports support from the Directorate of Forensic Science Services, an attached office of the MHA (Ministry of Home Affairs) research project (DFSS28(1)2019/EMR/6) at the Department of Forensic Science (Formerly Institute of Forensic Science & Criminology), Panjab University, Chandigarh, India, RUSA 2·0 grant to Panjab University and PAIR grant (ANRF/PAIR/2025/000006/PAIR) to Panjab University from Anusandhan National Research Foundation (ANRF), outside the submitted work. J A Singh reports consulting fees from ROMTech, Atheneum, Clearview Healthcare Partners, Yale, Hulio, Horizon Pharmaceuticals/DINORA, ANI/Exeltis, USA Inc, Frictionless Solutions, Schipher, Crealta/Horizon, Medisys, Fidia, PK Med, Two labs Inc, Adept Field Solutions, Clinical Care Options, Putnam Associates, Focus Forward, Navigant Consulting, Spherix, MedIQ, Jupiter Life Science, UBM LLC, Trio Health, Medscape, WebMD, Practice Point Communications, the NIH, and the American College of Rheumatology; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from the speaker's bureau of Simply Speaking; support for attending meetings or travel, or both, from OMERACT; participation on a data safety monitoring board or advisory board with the US Food and Drug Administration (FDA) Arthritis Advisory Committee; leadership or fiduciary role in other board, society, committee, or advocacy group, paid or unpaid, as a past steering committee member of OMERACT, an international organisation that develops measures for clinical trials and receives arm's length funding from 12 pharmaceutical companies; stock or stock options in aTyr Pharmaceuticals, Atai Life Sciences, Kintara Therapeutics, Intelligent Biosolutions, Acumen Pharmaceutical, TPT Global Tech, Vaxart Pharmaceuticals, Aytu Biopharma, Adaptimmune Therapeutics, GeoVax Labs, Pieris Pharmaceuticals, Enzolytics, Seres Therapeutics, Tonix Pharmaceuticals Holding Corp, Aebona Pharmaceuticals, and Charlotte's Web Holdings; previously owned stock options in Amarin, Viking, and Moderna Pharmaceuticals; outside the submitted work. R Tabares-Seisdedos reports grants or contracts from the Valencian Regional Government's Ministry of Education (PROMETEO/CIPROM/2022/58) and from the Spanish Ministry of Science, Innovation and Universities (PID2021-129099OB-I00), outside the submitted work. J H V Ticoalu reports leadership or fiduciary role in other board, society, committee or advocacy group, paid or unpaid, from Benang Merah Research Center, Indonesia as co-founder; outside the submitted work. S J Tromans reports grants or contacts as part of the 2023/4 Adult Psychiatric Morbidity Survey team, collecting epidemiological data on community-based adults living in England, a contracted study from NHS Digital, via the Department of Health and Social Care. S J Tromans has also contributed to multiple chapters of the 2023/4 Adult Psychiatric Morbidity Survey report (payments made to University of Leicester); was lead investigator on a study funded by the National Institute for Health and Care Research Clinical Research Network, on optimising survey design for people with

learning disability and autistic people (payments made to University of Leicester); was lead investigator on a study from the National Institute for Health and Care Research related to evaluate a national training programme for health and social care professionals relating to learning disability and autism (payments made to University of Leicester); was co-applicant on study funded by the National Institute for Health and Care Research related to identification, recording, and reasonable adjustments for people with a learning disability and autistic people in NHS electronic clinical record systems (payments made to University of Leicester); was co-applicant on a study funded by the National Institute for Health and Care Research related to medication support interventions and strategies for people with learning disabilities (payments made to University of Leicester); was lead applicant on a study funded by the Baily Thomas Charitable Fund, investigating barriers, enablers, and interventions to facilitate deprescribing for people with intellectual disability (payments made to University of Leicester); was co-lead applicant on a study funded by Jazz Pharmaceuticals related to the impact of cannabidiol on challenging behaviour among people with intellectual disability (payments made to University of Leicester via University of Plymouth [lead institution]); was lead investigator on a study relating to understanding the barriers and facilitators to clinical engagement and research involvement for adults with intellectual disability from minority ethnic backgrounds residing in the East Midlands; payment or honoraria for lectures, presentations, speakers bureaus, manuscript writing, or educational events from Cornwall Intellectual Disability Equitable Research (CIDER) to attend a conference and Dartmouth Health; reports support for attending meetings or travel, or both, from the Royal College of Psychiatrists for accommodation and travel; leadership or fiduciary role in other board, society, committee, or advocacy group, paid or unpaid, as Academic Secretary and Executive Committee Member for the Neurodevelopmental Psychiatry Special Interest Group and Psychiatry of Intellectual Disability Faculty at the Royal College of Psychiatrists; is Associate Editor for *Journal of Mental Health Research in Intellectual Disabilities*; Editorial Board Member for *Progress in Neurology and Psychiatry*, *Advances in Mental Health and Intellectual Disability*, *Advances in Autism*, *BMC Psychiatry*, and *BJPsych Open*; and Editor of *Psychiatry of Intellectual Disability Across Cultures* (Oxford University Press); outside the submitted work. E Upadhyay reports the following patents: "A system and method of reusable filters for anti-pollution mask" (published); "A system and method for electricity generation through crop stubble by using microbial fuel cells" (published); "A system for disposed personal protection equipment (PPE) into biofuel through pyrolysis and method" (published); "A novel herbal pharmaceutical aid for formulation of gel and method thereof" (published); "Herbal drug formulation for treating lung tissue degenerated by particulate matter exposure" (published); "A method to transform cow dung into the wall paint by using natural materials and composition thereof" (published); "Biodegradable packaging composition and method of preparation thereof" (filed); "Eco-friendly bio-shoe polish from banana and turmeric" (filed); "Honey-based polyherbal syrup composition to treat air pollution-induced inflammation and preparation method thereof" (filed); "Process for preparing a caffeine free, antioxidant and nutrient rich beverage" (filed); "Polyherbal oral mist composition for dual relief and method for preparation thereof" (filed); and "Method for fabricating sustainable waterproof material sheets from LDPE plastic wastes" (filed); outside the submitted work. J Zhao reports support for the present manuscript from Fundamental Research Funds for the Central Universities (2024BSSXM20), Zhejiang University Qiushi Flying Eagle Program, Key Laboratory of Integrated Care for Geriatric Chronic Diseases (Kunming Medical University, School of Nursing) and the Yunnan Provincial Education Department (grant number 2024HTHLYB05), Doctoral Student Special Program of the China Association for Science and Technology (CAST) Young Talent Support Project. M Zielińska reports other financial support as an Alexion AstraZeneca Rare Disease employee; outside the submitted work. All other authors declare no competing interests.

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.

Acknowledgments

This paper was developed as part of the GBD Collaborator Network and GBD Protocol with support from the GBD Secretariat, IHME, and the GBD Collaborator Network under the IHME ID 6104. We acknowledge additional funding from the US National Institute of Allergy and Infectious Diseases of the US National Institutes of Health (R01AI152721). The content is solely the responsibility of the authors and does not necessarily represent the official views of the US National Institutes of Health. We thank Jeffrey Imai-Eaton and Joshua Salomon for their invaluable comments and constructive feedback on an earlier version of the manuscript.

Editorial note: The Lancet Group takes a neutral position with respect to territorial claims in published maps and institutional affiliations.

References

1 GBD 2021 HIV Collaborators. 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. *Lancet HIV* 2024; **11:** e807–22.
2 GBD 2019 HIV Collaborators. 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. *Lancet HIV* 2021; **8:** e633–51.
3 GBD 2017 HIV collaborators. 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. *Lancet HIV* 2019; **6:** e831–59.
4 Monod M, Brizzi A, Galiwango RM, et al, and the Rakai Health Sciences Program, and the PANGEA-HIV consortium. Longitudinal population-level HIV epidemiologic and genomic surveillance highlights growing gender disparity of HIV transmission in Uganda. *Nat Microbiol* 2024; **9:** 35–54.
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. *Lancet* 2010; **376:** 41–48.
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. *Am J Reprod Immunol* 2013; **69** (suppl 1)**:** 20–26.
7 The Lancet HIV. Addressing inequalities still key to ending HIV/AIDS. *Lancet HIV* 2023; **10:** e1.
8 Gupta GR, Parkhurst JO, Ogden JA, Aggleton P, Mahal A. Structural approaches to HIV prevention. *Lancet* 2008; **372:** 764–75.
9 Kuchukhidze S, Panagiotoglou D, Boily MC, et al. 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. *Lancet HIV* 2023; **10:** e107–17.
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:** 3243–58.
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:** 503–11.
12 Wexler A, Kates J, Oum S, Lief E. Donor government funding for HIV in low- and middle-income countries in 2023. KFF. July 22, 2024. https://www.kff.org/report-section/donor-government-funding-for-hiv-in-low-and-middle-income-countries-in-2023-key-findings/ (accessed June 26, 2025).
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:** e26431.
14 Hallett TB, Menzies NA, Resch S, et al. The case for optimal investment in combating HIV, tuberculosis, and malaria: a global modelling study. *Lancet* 2025; **406:** 261–70.
15 KFF. Administration releases additional details of fiscal year 2026 budget request. June 4, 2025. https://www.kff.org/global-health-policy/administration-releases-additional-details-of-fiscal-year-2026-budget-request/ (accessed Feb 24, 2026).
16 ten Brink DC, 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. *Lancet HIV* 2025; **12:** e346–54.

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.

18 UNAIDS. AIDS, crisis and the power to transform. UNAIDS Global AIDS Update. 2025. July 2025. https://www.unaids.org/sites/default/files/2025-07/2025-global-aids-update-JC3153_en.pdf (accessed July 1, 2026).

19 UN Women. At risk and underfunded: how funding cuts are threatening efforts to end violence against women and girls. October 2025. https://knowledge.unwomen.org/sites/default/files/2025-10/at-risk-and-underfunded-how-funding-cuts-are-threatening-efforts-to-end-violence-against-women-and-girls-en.pdf (accessed Feb 23, 2026).

20 UNAIDS. Impact of US funding cuts on HIV programmes in East and Southern Africa. March 31, 2025. https://www.unaids.org/en/resources/presscentre/featurestories/2025/march/20250331_ESA-region_fs (accessed Feb 23, 2026).

21 GBD 2019 Diseases and Injuries Collaborators. 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. *Lancet* 2020; **396:** 1204–22.

22 HSRC. The sixth South African national HIV prevalence, incidence, behaviour and communication survey (SABSSM VI). Launch of the key findings. Nov 27, 2023. https://hsrc.ac.za/special-projects/sabssm-survey-series/sabssmvi-media-pack-november-2023 (accessed Sept 25, 2025).

23 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)**:** S235–44.

24 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** (suppl 1)**:** 783.

25 GBD 2023 Intimate Partner Violence and Sexual Violence against Children Collaborators. 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. *Lancet* 2026; **407:** 31–52.

26 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. *Lancet HIV* 2019; **6:** e382–95.

27 Stevens GA, Alkema L, Black RE, et al, and The GATHER Working Group. Guidelines for Accurate and Transparent Health Estimates Reporting: the GATHER statement. *Lancet* 2016; **388:** e19–23.

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.

29 Meyer-Rath G, Imai-Eaton JW. Optimising HIV spending in eastern Europe and central Asia. *Lancet HIV* 2024; **11:** e654–55.

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. https://data.europa.eu/doi/10.2900/818446 (accessed Sept 29, 2025).

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. *Lancet HIV* 2024; **11:** e690–99.

32 The Lancet HIV. Russia spiralling into an HIV crisis. *Lancet HIV* 2025; **12:** e669.

33 Piñeirúa A, Sierra-Madero J, Cahn P, et al. The HIV care continuum in Latin America: challenges and opportunities. *Lancet Infect Dis* 2015; **15:** 833–39.

34 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. *J Int AIDS Soc* 2020; **23:** e25468.

35 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:** 20016.

36 Hegdahl HK, Fylkesnes KM, Sandøy IF. Sex differences in HIV prevalence persist over time: evidence from 18 countries in Sub-Saharan Africa. *PLoS One* 2016; **11:** e0148502.

37 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 Glob Public Health* 2023; **3:** e0002146.

38 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:** e202–13.

39 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. *Lancet* 2022; **399:** 803–13.

40 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:** e001465.

41 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. *Lancet Glob Health* 2025; **13:** e1669–80.

42 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. *Lancet* 2025; **406:** 283–94.

43 UNAIDS. Global HIV & AIDS statistics — fact sheet. https://www.unaids.org/en/resources/fact-sheet (accessed Oct 28, 2025).

44 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:** e0208167.

45 Matanje B, Masha RL, Rwibasira G, et al. The global HIV response at a crossroads: protecting gains and advancing sustainability amid funding disruptions. *Lancet HIV* 2025; **12:** e532–36.

46 Groves AK, Reyes HLM, Moodley D, Maman S. HIV positive diagnosis during pregnancy increases risk of IPV postpartum among women with no history of IPV in their relationship. *AIDS Behav* 2018; **22:** 1750–57.

47 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. *Lancet HIV* 2024; **11:** e542–51.

48 Cullen C. Method matters: the underreporting of intimate partner violence. *World Bank Econ Rev* 2023; **37:** 49–73.

49 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 Med* 2014; **11:** e1001609.

50 Brennan J, Kuhns LM, Johnson AK, Belzer M, Wilson EC, Garofalo R, and the Adolescent Medicine Trials Network for HIV/AIDS Interventions. 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:** 1751–57.

51 Supervie V, Breban R. Brief report: per sex-act risk of HIV transmission under antiretroviral treatment: a data-driven approach. *J Acquir Immune Defic Syndr* 2018; **79:** 440–44.

52 US Department of State. America First Global Health Strategy. September 2025. https://www.state.gov/wp-content/uploads/2025/09/America-First-Global-Health-Strategy-Report.pdf (accessed March 27, 2026).

53 Morrison JS, Gostin LO. Promise and gaps in America First strategy for global health. *BMJ* 2025; **391:** r2088.

54 World Health Organization, International Bank for Reconstruction and Development/The World Bank. Tracking universal health coverage: 2023 global monitoring report. Sept 18, 2023. https://www.who.int/publications/i/item/9789240080379 (accessed March 27, 2026).

55 Sales JM, Swartzendruber A, Phillips AL. Trauma-informed HIV prevention and treatment. *Curr HIV/AIDS Rep* 2016; **13:** 374–82.

56 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:** e0259223.

57 Morgan R, Kalbarczyk A, Decker M, et al. Gender-responsive monitoring and evaluation for health systems. *Health Policy Plan* 2024; **39:** 1000–05.