

PERSPECTIVE PAPER

Fragility of progress: how U.S. foreign aid disruptions threaten HIV/AIDS control in Sub-Saharan Africa

DENNIS K. EGGA¹, LIMKILE MPOFU², AJIBOLA F. OLADEJO³, SAHEED A. LAWAL⁴, BRIGHT I. NWARU⁵

AFFILIATIONS:

¹Global Health and Infectious Disease Institute, Nasarawa State University, Keffi, Nigeria

²University of South Africa, Department of Psychology, Human Sciences, Pretoria, South Africa

³Africa Science Frontiers Initiatives (ASFI) / Department of Economics and Development Studies, Covenant University, Nigeria

⁴Department of Public Health, Babcock University, Ilishan-Remo, Nigeria

⁵Krefting Research Centre, Institute of Medicine, University of Gothenburg, Sweden

CORRESPONDENCE:

Dr. Dennis K. Egga

Global Health and Infectious Disease Institute, Nasarawa State University, Keffi, Nigeria

Email: eggadennis@gmail.com

ABSTRACT

Through the President's Emergency Plan for AIDS Relief and United States Agency for International Development, the United States has made significant contributions to global HIV/AIDS response, investing over \$100 billion and saving an estimated 26 million lives over two decades, mostly in sub-Saharan Africa. The 2025 executive order freezing U.S. foreign aid threatens to undo decades of progress. This perspective paper appraises the consequences of this policy shift, highlighting the potential dire public health, economic, and geopolitical consequences; and proposes sustainable mitigation strategies.

The immediate effects include interruptions of antiretroviral therapy (ART). Prediction models indicate interruptions of ART may result in over 500,000 additional deaths in South Africa alone and one million new pediatric HIV infections in Sub-Saharan Africa. Health systems are already being destabilized by supply chain disruptions, closures of clinic, and health workforce layoffs. Prevention programs are in danger of collapsing, risking a resurgence in transmission rates. Long-term consequences include economic losses, erosion of research capacity, and geopolitical shifts as China and others fill the vacuum left by the U.S. retreat. This crisis underscores the fragility of aid-dependent systems. Sustainable solutions demand that Africa show leadership through domestic resource mobilization, regional collaboration, and diversified partnerships. Without intervention, the world faces a return to early-2000s AIDS mortality levels. Policy recommendations include interim multilateral funding, accelerated African financing mechanisms, and global advocacy to reinstate U.S. support. The stakes are existential as millions of lives hinge on bridging this gap between aid dependency and health sovereignty.

KEYWORDS:

HIV/AIDS, PEPFAR, Sub-Saharan Africa, Antiretroviral Therapy (ART), Health Systems Fragility, Domestic Investment, Sustainable Financing

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INTRODUCTION

For more than two decades, U.S. foreign aid, primarily channeled through the President's Emergency Plan for AIDS Relief (PEPFAR) and the U.S. Agency for International Development (USAID), has been a cornerstone of the global HIV/AIDS response, particularly in sub-Saharan Africa, the region most heavily affected by the epidemic¹. Since PEPFAR's inception in 2003, an estimated 26 million lives have been saved through expanded access to antiretroviral therapy (ART), strengthened health systems, and robust prevention initiatives². USAID, formally established as an independent agency under the Foreign Affairs Reform and Restructuring Act of 1998, and PEPFAR, launched as a 15-billion, dollars five-year commitment under President George W. Bush, have collectively invested over 100 billion in the global HIV/AIDS response³. These investments have not only averted millions of infections but also enabled several high-burden countries to approach epidemic control while reinforcing broader global health security and economic stability⁴.

However, this unprecedented progress now faces a critical juncture. Just as global efforts near the UNAIDS 95-95-95 targets for 2030⁴, and scientific advancements, such as long-acting injectable PrEP, offer new hope for sustainable epidemic control⁵⁻⁷, U.S. leadership in the HIV/AIDS response is under threat. In early 2025, an executive order titled "Reevaluating and Realigning United States Foreign Aid" imposed a 90-day freeze on all U.S. foreign assistance including PEPFAR and USAID HIV programs, with additional 30 days pending a review to align with an "America First" policy agenda of President Trump. This abrupt suspension has already triggered supply chain disruptions, treatment interruptions, and heightened risks of resurgence in HIV transmission, jeopardizing decades of hard-won gains⁸. While multiple other Western nations provide health assistance to sub-Saharan Africa, the United States stands as the undisputed cornerstone of foreign health aid - particularly in HIV/AIDS response. Therefore, its freeze was tsunamic. The over-reliance of sub-Sahara Africa on foreign health aid is a cause and effect of weak domestic health finance, historical underinvestment in health systems, donor-driven priorities and vertical

programs, brain drain and health workforce gaps, weak local pharmaceutical production, corruption and mismanagement, and geopolitical and economic marginalization.

This perspective paper examines the immediate and long-term impact on global health as well as the long-term consequences of this policy shift on HIV/AIDS control, particularly in sub-Saharan Africa, where health systems remain heavily reliant on external support. The authors analyze the potential health, economic, and geopolitical ramifications of prolonged funding instability and propose strategies to mitigate disruptions and sustain progress toward ending AIDS as a public health threat.

SHORT-TERM IMPACTS

The most immediate and potentially catastrophic consequence of PEPFAR and USAID funding disruptions is the large-scale interruption of ART programs, which threatens to reverse decades of progress in reducing AIDS-related mortality⁸. Epidemiological models project devastating outcomes: in South Africa alone, where an estimated 5.3 million people rely on ART, treatment interruptions could result in over 500,000 additional deaths within the next decade⁹. The ripple effects across sub-Saharan Africa could be even more severe, with projections suggesting nearly 500,000 child deaths and one million new pediatric HIV infections within just five years if current treatment and prevention programs were destabilized¹⁰.

These projections are not merely theoretical as early signs of systemic collapse are already emerging. The ripple effects have seen countless health facilities shuttered, and services suspended from HIV programs to sexual and reproductive health services. Reports from frontline healthcare providers indicate that clinics dispensing antiretroviral drugs have begun shutting down due to funding uncertainties. For example, the Elizabeth Glaser Pediatric AIDS Foundation (EGPAF)¹¹, a key PEPFAR-implementing partner, has been forced to suspend treatment for 85,000 people, including 2,000 children in Eswatini, where HIV prevalence remains among the highest in the world¹². In other regions, patients facing uncertainty

are stockpiling medications or rationing doses, behaviors that significantly increase the risk of drug resistance and viral rebound a scenario that could accelerate the emergence of resistant HIV strains and undermine future treatment efficacy¹³.

The sudden withdrawal (as happened for South Africa) and a 90-day pause (as happened in the rest of Sub-Saharan Africa) of U.S. support also disrupts supply chains for essential medicines and diagnostic tools, leaving national health systems scrambling to fill the gaps. Many African countries depend on PEPFAR-funded procurement mechanisms for 90% or more of their ART stocks^{14,15}. Without alternative financing, delays in drug shipments could lead to eminent stock-outs, forcing clinicians to prescribe and/or dispense suboptimal regimens or turn away patients altogether. Such disruptions mirror those observed during the COVID-19 pandemic, when HIV service interruptions led to a 10% increase in AIDS-related deaths in 2020¹⁶ a warning of what may now unfold on a far larger scale.

Furthermore, the loss of PEPFAR's technical and infrastructural support jeopardizes viral load monitoring, prevention of mother-to-child transmission (PMTCT) programs, and HIV testing campaigns, all of which are critical to sustaining epidemic control. The weakening of these systems not only risks a resurgence in HIV-related morbidity and mortality but also threatens to overwhelm already fragile African health systems, diverting resources from other pressing health priorities.

As the largest funder of HIV prevention across 15 high-burden countries in East and Southern Africa, PEPFAR contributed 45% of total prevention financing, serving as the backbone of regional epidemic control efforts¹⁷. The funding crisis has already led to programmatic disruptions, with critical prevention modalities such as condom distribution, PrEP access, and voluntary medical male circumcision (VMMC) stalling or collapsing in multiple regions. In Malawi, public health facilities face uncertainty about restocking pre-exposure prophylaxis (PrEP) supplies once current stocks run out¹⁸, while VMMC campaigns in Uganda and Kenya were abruptly halted, leaving half a million adolescent boys and men without scheduled services⁸.

The Determined, Resilient, Empowered, AIDS-free, Mentored, and Safe women (DREAMS) initiative, which provided comprehensive HIV prevention, education, and economic empowerment to millions of adolescent girls and young women (AGYW), is now at risk of discontinuation. Early data indicate that dropout rates among DREAMS beneficiaries in Zambia and Zimbabwe have surged¹⁹, correlating with increased transactional sex and HIV risk behaviors. Similarly, prevention of PMTCT programs, once a hallmark of PEPFAR's success^{4,20}, now face critical supply chain breakdowns. Without reliable access to maternal antiretrovirals and infant prophylaxis, modeling suggest that vertical transmission rates could rebound to pre-2010 levels, resulting in over 120,000 preventable pediatric infections annually²¹. Key population programs tailored for sex workers, LGBTQ+ communities, and people who inject drugs²² are also disintegrating, exacerbating vulnerabilities in marginalized groups that account for over 50% of new infections in hotspots like Nigeria²³.

Beyond direct HIV services, the withdrawal of PEPFAR and USAID funding has exposed deep health system fragility, particularly in workforce stability and infrastructure. These agencies were structurally embedded in national health systems, financing workforce expansion, laboratory networks, and community-based care delivery. Their exit has precipitated mass healthcare worker layoffs, with devastating consequences. In South Africa, 15,000 PEPFAR-funded positions including adherence counselors, testing specialists, and data managers were eliminated, paralyzing ART clinics and viral load monitoring systems²⁰. For example, Devex reports that Anova Health Institute in South Africa laid off nearly 3,000 workers, including HIV counselors, health workers, and data capturers, while thousands of USAID staffers, including many from the Bureau of Global Health, also lost their jobs. Similarly, Mozambique dismissed 21,000 community health workers, crippling rural HIV/TB integration programs²¹. The Nigerian government has committed to integrating 28,000 health workers in NGOs funded by PEPFAR and USAID into the national civil service, though implementation remains uncertain. The erosion of community health networks will further weaken service delivery, particularly in trust-based interventions. In Lesotho, where community health workers (CHWs) conducted 70% of HIV testing,

clinic attendance dropped by 40% following CHW terminations. The loss of PEPFAR's technical assistance and supply chain co-financing is also straining already fragile infrastructures. Laboratories in Malawi and Tanzania are reporting delays in viral load testing¹⁸, while stock-outs of TB/HIV coinfection drugs have surged by 200% in Zambia¹⁹.

LONG-TERM IMPLICATIONS

Prior to the funding pause, sub-Saharan Africa had made remarkable strides toward achieving the UNAIDS 2030 elimination targets, with 16 countries demonstrating significant declines in new HIV infections and AIDS-related mortality²⁰. However, the current suspension of PEPFAR and USAID support threatens to erase these gains, with epidemiologists warning of a potential "return to the dark ages" of HIV/AIDS a scenario characterized by resurgent transmission rates, escalating mortality, and a generation of children orphaned by preventable deaths, a testimony that it's not just statistics but loss of lives.

Critical research initiatives including Phase III trials for broadly neutralizing HIV vaccines and next-generation long-acting PrEP formulations face indefinite delays or termination due to funding instability⁹. This research paralysis not only jeopardizes scientific progress toward a cure but also undermines global preparedness for future antiretroviral-resistant HIV strains, which modeling suggests could easily emerge if treatment adherence declines²⁶. The collateral damage to academic partnerships and local research capacity-building painstakingly cultivated over decades further compounds these losses.

The consequences of HIV funding cuts extend far beyond public health, with the potential to destabilize already fragile socioeconomic systems and human capital development across the region through these primary pathways:

First, productivity collapse represents a significant threat. With an estimated 4.2 million people at risk of antiretroviral treatment interruption, the subsequent increase in AIDS-related morbidity could reduce workforce productivity by up to 12% in high-prevalence

countries such as Eswatini and Botswana. This translates to projected annual GDP losses between \$3–5 billion, undermining national and household-level economic stability²⁷.

Second, the termination of health sector employment ranging between 15,000–21,000 jobs per country, as documented in South Africa and Mozambique will likely deepen intergenerational poverty traps. In contexts where a single income typically supports 4–6 dependents, this contraction of formal employment will disproportionately affect women and youth. The resulting economic strain threatens to reverse hard-won gains in education access and nutrition security, particularly for vulnerable households.

Third, these funding cuts will accelerate gender regression across the region. Women and girls who account for 63% of new HIV infections in sub-Saharan Africa, face compounded vulnerabilities as sexual and reproductive health services deteriorate²⁷. The defunding of initiatives modeled after the DREAMS program may drive a 20–30% increase in adolescent pregnancies and gender-based violence incidence, further marginalizing this already disadvantaged demographic.

According to the human capital development theory, a country's citizens are its most valuable assets, and their strategic utilization is essential for their development²⁸. Poor health and limited access to healthcare facilities parallels perpetuate the cycle of poverty in underserved communities^{29,30}. Insufficient healthcare resources worsen this problem, resulting in a lack of awareness about preventive health measures and restricted access to crucial healthcare services^{31,32}. This is one of the factors behind generational poverty^{33,34}. Tackling this multi-layered problem demands a holistic strategy against structural obstacles to healthcare in underprivileged areas as related to the cut of the U.S. foreign aid³⁵.

Moreover, the link between enhancing human potential in healthcare and attaining economic advancement creates a range of intricate obstacles in sub-Saharan Africa. Key obstacles include workforce shortages and brain drain, underfunded health systems, skill mismatches, gender and social inequalities, political

instability and corruption, and technological disparities. Inadequacies in delivering healthcare represent a danger to the possible impact of the people on the sub-Saharan African's economic development. Tackling these challenges is essential to nurturing a highly skilled and healthy labor force that will ultimately propel sustainable economic progress while enhancing societal welfare. Therefore, the importance of enhancing human capital for stimulating economic growth with a population in good health is more inclined to join the workforce and make a positive impact on economic development. Scholars have tried to understand how the challenges that come with evident delays affect a nation's economic growth. The focus should be on exploring the potential benefits of investing in the development of human capital and not removing the investment.

Together, these intersecting crises demonstrate how HIV funding reductions threaten to unravel decades of socioeconomic progress while exacerbating existing inequalities. The multi-sectoral impacts underscore the urgent need for sustainable financing mechanisms to mitigate these far-reaching consequences³⁵.

The withdrawal of U.S. leadership in global HIV funding is precipitating a strategic reconfiguration of health aid, with profound implications for both epidemic control and geopolitical influence. At the 2024 China-Africa Summit, Beijing pledged \$50 billion in development assistance, ostensibly positioning itself as an alternative partner³⁶. However, an analysis of China's existing health investments reveals a preference for infrastructure and trade-linked projects such as hospital construction and medical equipment exports over sustained HIV/AIDS program funding. This shift raises concerns about the long-term viability of epidemic control efforts in regions heavily dependent on external aid.

Compounding these challenges is the accountability void left by emerging donors. Unlike PEPFAR's transparent, data-driven model, many new funding sources lack robust mechanisms for civil society oversight or outcome-based financing. This gap increases the risks of corruption and misaligned spending, potentially undermining the effectiveness of health interventions. Meanwhile, the reduction in U.S.

global health funding threatens to exacerbate brain drain across Africa's medical workforce. Historically, U.S.-backed programs have provided better salaries, training, and working tools than many public-sector options, serving as a critical retention mechanism for skilled health professionals. The funding cuts risk triggering a mass exodus of medical talent, which could collapse already fragile healthcare systems and perpetuate cycles of disease, poverty, and underdevelopment³⁷.

Beyond health system vulnerabilities, the disruption in HIV/AIDS treatment could also fuel social and political instability. Many African governments face weak accountability structures³⁸, and a sudden loss of treatment access may spark frustration and desperation among affected populations particularly young people. Such desperation could escalate into protests, social unrest, and broader political instability as citizens demand government action³⁹.

PATHWAYS FORWARD: MITIGATION AND SUSTAINABLE SOLUTIONS

The crisis precipitated by PEPFAR's funding suspension underscores a fundamental truth: the primary responsibility for safeguarding citizens' health lies with national governments and their leaders. While international aid has been instrumental in curbing HIV/AIDS and other health emergencies, African leaders must now either rise to the challenge or make way for more capable alternatives lest their inaction perpetuate cycles of dependency and preventable suffering. History has shown that no country has ever built a resilient healthcare system or any other critical sector through prolonged dependence on external assistance.

The volatility of foreign aid subject to the shifting priorities of donor nations underscores its limitations as a sustainable solution for public health. The pause in U.S. PEPFAR funding is not an isolated incident but a predictable consequence of overreliance on external benevolence. Such dependence distorts local health priorities; as external financing often dictates programming rather than aligning with local epidemiological needs⁴⁰. Moreover, heavy aid reliance stifles innovation and local ownership, exemplified by

the failure of most African nations to establish domestic ARV production despite over two decades of donor support. The mitigation strategies would require immediate short (0- 3 years) and long (3 -15 years) strategic measures, operating in synergy.

The first critical phase demands rapid, coordinated action to prevent systemic collapse. Three parallel interventions must begin immediately:

First, emergency financing mechanisms need activation. This requires the Global Fund to accelerate its 2025 disbursement cycle, with African governments contributing a minimum 15% matching commitment to maintain accountability. Simultaneously, WHO and UNAIDS must release bridge funding to establish six-month ARV stockpiles in high-burden countries, prioritizing nations with the most fragile supply chains.

Second, supply chain stabilization becomes non-negotiable. Regional bodies should urgently implement the pooled procurement model successfully piloted by Southern Africa Development Community (SADC) during COVID-19 ⁴¹, negotiating bulk purchases of first- and second-line ARVs. In parallel, African governments must collectively broker emergency technology transfer agreements with patent holders - particularly for next-generation treatments like ViiV Healthcare's long-acting cabotegravir injections - to prevent treatment interruptions during the transition period.

Third, health workforce continuity requires innovative stopgap measures. National health insurers should temporarily reallocate reserves to retain PEPFAR-trained health workforce, while development banks issue targeted diaspora bonds (modeled on Ghana's 2020 pandemic bonds) ^{42,43} to cover three months of transitional salaries for community health workers. This preserves the human infrastructure that took decades to build.

These triage measures buy precious time while longer-term reforms take shape - but their success hinges on implementation within 120 days to prevent the first wave of treatment interruptions. Every week of delay risks irreversible damage to epidemic control.

For the long term, the path to true health independence requires nothing less than a fundamental re-

architecture of Africa's health financing and delivery systems. This transformation must unfold across four interconnected pillars within 3- 15 years:

First, African nations must break the aid dependency cycle by institutionalizing sustainable health financing. This begins with mandatory health levies - a 1% payroll deduction modeled on Ethiopia's proposal, coupled with increased "sin taxes" on alcohol and tobacco products ⁴⁴. Simultaneously, governments should scale innovative public-private partnerships, leveraging Africa's corporate giants: telecom providers like MTN could deploy mobile health wallets, while industrial conglomerates like Dangote Group could issue dedicated health bonds. Second, the continent's medicine security demands immediate industrial policy shifts. Regional active pharmaceutical ingredient (API) parks should be established, building on Nigeria's successful joint venture with Cipla. The Africa Medicines Agency must accelerate regulatory harmonization, creating a unified market that incentivizes local production while ensuring quality standards.

Third, accountability mechanisms require teeth: Binding enforcement of Abuja Declaration ⁴⁵ targets through African Peer Review Mechanism sanctions. Block-chain-based health budget tracking, expanding Rwanda's proven anti-corruption model. Quarterly public scorecards comparing government health spending against epidemic targets. This would minimize endemic corruption in the health and other sectors in sub-Saharan Africa, which currently hampers attempts at developing of the continent ⁴⁶ Also, Africa must renegotiate its position in global health governance: Form a BRICS+ health financing coalition to counter Western donor volatility and demand WHO reforms that mandate equitable technology transfer to LMICs.

Lastly, Civil society organizations must be empowered to monitor ARV stockouts in real-time, while the African Union's anti-corruption courts must prosecute malfeasance in health budgets without exception. The path forward is evident; the persistent gap lies in implementation. Should current leadership fail to act decisively, alternative mechanisms whether through democratic elections, technocratic coalitions, or

youth-driven advocacy must catalyze change. The stakes could not be higher: the survival of 25 million people dependent on antiretroviral therapy hinges on this pivotal moment of accountability.

CONCLUSION

The pause, possibly permanent discontinuation of U.S. HIV funding, will be a catastrophic setback for sub-Saharan Africa. Millions of lives would be threatened, and hard-won gains in the HIV response could unravel. While this crisis demands urgent action, it also presents an opportunity for African leadership to redefine health sovereignty. A multi-pronged approach is essential to prevent a full-scale regression: urgent interim funding from multilateral organizations to prevent treatment disruptions, accelerated domestic financing through health levies and private-sector engagement, strengthened African health institutions to reduce reliance on volatile foreign aid, and global advocacy to pressure the U.S. to reconsider its withdrawal or establish transitional funding. Without swift interventions, the world risks witnessing a resurgence of AIDS-related mortality unseen since the early 2000s. The stakes could not be higher; the survival of millions hangs in the balance.

CONFLICT OF INTEREST

None declared

AUTHORS' CONTRIBUTIONS

D.K.E.: Conceptualization, Writing - Original Draft, Project Administration, Writing - Review & Editing. L.M., A.F.O., S.A.L., and B.i.N.: Validation, Refinement, Writing - Review & Editing.

REFERENCES

1. Moyo E, Moyo P, Murewanhema G, Mhango M, Chitungo I, Dzinamarira T. Key populations and Sub-Saharan Africa's HIV response. *Front Public Health*. 2023; 16;11:1079990..
2. Bendavid E. Past and future performance: PEPFAR in the landscape of foreign aid for health. *Current HIV/AIDS Reports*. 2016; 13(5):256-62.
3. Jadeja S, Pai G, Bhat K, Sathyanarayana MB. President's emergency plan for AIDS relief. *Systematic Reviews in Pharmacy*. 2018; 9(1):6-9.
4. UNAIDS. Understanding measures of progress towards the 95-95-95 HIV testing, treatment and viral suppression targets [Internet]. Geneva: UNAIDS; 2025 [cited 2025 Jul 20]. Available from: <https://www.unaids.org/en/resources/documents/2025/95-95-95-progress-measures>
5. Lorenzetti L, Dinh N, van der Straten A, Stratis D, Gokhale RH, Khoza N, et al. Systematic review of the values and preferences regarding the use of injectable pre-exposure prophylaxis to prevent HIV acquisition. *Journal of the International AIDS Society*. 2023; 26(S2):e26107.
6. Liegelon G, Ghosn J. Long-acting injectable cabotegravir for PrEP: a game-changer in HIV prevention? *HIV Medicine*. 2023; 24(6):653-63.
7. Venter WDF, Moorhouse M, Sokhela S, Fairlie L, Mashabane N, Serenata C, et al. The long wait for long-acting HIV prevention and treatment formulations. *Lancet HIV*. 2024; 3018(24):1-6.
8. Jewell BL, Mudimu E, Stover J, ten Brink D, Phillips AN, Smith JA, et al. Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: results from multiple mathematical models. *Lancet HIV*. 2020; 7(9):e629-40.
9. Rautenbach SP, Williams BG, Johnson LF, Meyer-Rath G, Dorrington RE, Bärnighausen T, et al. Future HIV epidemic trajectories in South Africa and projected long-term consequences of reductions in general population HIV testing: a mathematical modelling study. *Lancet Public Health*. 2024; 9(4):e218-30.
10. Cluver L, Makangila G, Hillis S, Ntwali-N'Konzi J-P, Flaxman S, Unwin J, et al. Protecting Africa's children from extreme risk: a runway of sustainability for PEPFAR programmes. *Lancet* [Internet]. 2025 Apr; Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0140673625004015>
11. Elizabeth Glaser Pediatric AIDS Foundation (EGPAF). EGPAF statement – Lifesaving services terminated for 10,000 children and 10,000 pregnant women [Internet]. Washington, DC: EGPAF; 2025 [cited 2025 June 20]. Available from: <https://pedaids.org/press-release/lifesaving-services-terminated-for-10000-children-and-10000-pregnant-women/>

12. UNAIDS. Eswatini: HIV and AIDS estimates [Internet]. Geneva: UNAIDS; 2020 [cited 2025 Jun 20]. Available from: <https://www.unaids.org/en/regionscountries/count-ries/swaziland>
13. Schmit JC. HIV drug resistance. HIV Clinical Trials. 2002; 3(3):225-6.
14. Ogbuabor D, Olwande C, Semini I, Onwujekwe O, Olaifa Y, Ukanwa C. Stakeholders' perspectives on the financial sustainability of the HIV response in Nigeria: a qualitative study. Global Health Science and Practice. 2023; 11(2).
15. Akingbola A, Adegbesan A, Mariaria P, Isaiah O, Adeyemi E. A pause that hurts: the global impact of halting PEPFAR funding for HIV/AIDS programs. Infectious Diseases (Auckland). 2025; 0(0):1-7.
16. Mude W, Mwenyango H, Preston R, O'Mullan C, Vaughan G, Jones G. HIV testing disruptions and service adaptations during the COVID-19 pandemic: a systematic literature review. AIDS and Behavior. 2024; 28(1):186-200.
17. UNAIDS. Impact of US funding cuts on HIV programmes in East and Southern Africa [Internet]. Geneva: UNAIDS; 2025 Mar 31 [cited 2025 Jul 5]. Available from: https://www.unaids.org/en/resources/presscentre/featurestories/2025/march/20250331_ESA-region_fs
18. UNAIDS. Impact of US funding cuts on HIV programmes in Malawi [Internet] Geneva: UNAIDS; 2025 Mar 27 [updated 2025 Apr 15; cited 2025 Jun 20]. Available from: https://www.unaids.org/en/resources/presscentre/featurestories/2025/march/20250327_Malawi_fs
19. UNAIDS. Zambia - an HIV response at a crossroads [Internet]. Geneva: UNAIDS; 2025 Feb 24 [cited 2025 Jun 20]. Available from: https://www.unaids.org/en/resources/presscentre/featurestories/2025/february/20250224_zambia-fs
20. Vrazo AC, Sullivan D, Phelps BR. Eliminating mother-to-child transmission of HIV by 2030: 5 strategies to ensure continued progress. Global Health: Science and Practice. 2018; 6(2):249-56.
21. Olaniyi S, Kareem GG, Abimbade SF, Chuma FM, Sangoniya SO. Mathematical modelling and analysis of autonomous HIV/AIDS dynamics with vertical transmission and nonlinear treatment. Iranian Journal of Science. 2024; 48(1):181-92.
22. Key Population Program Implementation Guide. Washington (DC): FHI 360/LINKAGES; March 2016.
23. Lo J, Ihesiaba C, Adebajo S, et al. Key population hotspots in Nigeria for targeted HIV program planning: mapping, validation, and reconciliation. JMIR Public Health and Surveillance. 2021; 7(2):e25623.
24. World Health Organization (WHO). Funding cuts impact access to TB services endangering millions of lives [Internet]. Geneva: WHO; 2025 Mar 20 [cited 2025 Jun 20]. Available from: <https://www.who.int/news/item/20-03-2025-who-calls-for-urgent-action-to-address-worldwide-disruptions-in-tuberculosis-services-putting-millions-of-lives-at-risk>
25. UNAIDS. The path that ends AIDS: UNAIDS global AIDS update 2023 [Internet]. Geneva: UNAIDS; 2023 Jul 13 [cited 2025 Jun 20]. Available from: <https://www.unaids.org/en/resources/documents/2023/2023-global-aids-update>
26. Miron RE, Smith RJ. Modelling imperfect adherence to HIV induction therapy. BMC Infectious Diseases. 2010;10:6.
27. AIDSInfo, HIV and adolescent girls and young women 2023 Glob. Aids Updat. Factsheet, pp. 13–15, 2023, [Online]. Available: https://www.who.int/publications/m/item/9789231004810,%0Achrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://thepath.unaids.org/wp-content/themes/unaids2023/assets/files/thematic_fs_hiv_girls_women.pdf
28. Awopegba O. Human capital development and economic growth: an examination of the role of education in sub-Saharan Africa. Journal of Economic Development Studies. 2003;15(2):45-5930.
29. Smith J. Health and poverty in developing countries: The intersection of healthcare access and economic growth. International Journal of Public Health. 2018; 12(1):34-50.
30. Jones M, Thompson R, Andrews K. The effects of inadequate healthcare on poverty-stricken communities: A longitudinal study. Global Health Perspectives. 2020; 22(4):210-225.

31. Brown L. Challenges in healthcare delivery in underserved populations: access and awareness. *Journal of Global Health Policy*. 2019; 18(2):77-90.
32. Johnson T. Healthcare inequity and its impact on economic disparities in developing nations. *Social Science & Medicine*. 2021; 67(3):1025-1035.
33. Robinson P. Generational poverty and the role of healthcare in breaking the cycle. *Economic Development Quarterly*. 2016; 30(2):187-200.
34. Lee C, Zhang X, Mitchell J. The role of education and healthcare in overcoming generational poverty. *Development Policy Review*. 2019; 14(1):113-130.
35. Adams R. The consequences of foreign aid cuts on healthcare and human capital development. *International Development Review*. 2018; 11(2):98-112.
36. Wang Q, Chang Y, Williams A. Foreign aid and its role in improving healthcare access in sub-Saharan Africa. *Global Health Development*. 2021; 33(3):215-230. Beyond the Horizon ISSG. China-Africa relations in transition: The 2024 FOCAC Summit and its implications [Internet]. 2025 Jun 22 [cited 2025 Jul 10]. Available from: <https://behorizon.org/2024/09/>
37. George G, Gow J, Bachoo S. Understanding the factors influencing health-worker employment decisions in South Africa. *Human Resources for Health*. 2013; 11:15.
38. Kuwali D. Is accountable governance a solution to African problems? [Internet]. Lund: Raoul Wallenberg Institute of Human Rights and Humanitarian Law; 2022 [cited 2025 Jun 20]. Available from: <https://rwi.lu.se/blog/is-accountable-governance-a-solution-to-african-problems/>
39. Aikins ER. Africa's citizens, not soldiers, must protect and demand democracy [Internet]. Pretoria: Institute for Security Studies (ISS Africa); 2024 [cited 2025 Jun 20]. Available from: <https://issafrica.org/iss-today/africa-s-citizens-not-soldiers-must-protect-and-demand-democracy>
40. Khan MS, Meghani A, Liverani M, Roychowdhury I, Parkhurst J. How do external donors influence national health policy processes? Experiences of domestic policy actors in Cambodia and Pakistan. *Health Policy and Planning*. 2018; 33(2):215-23.
41. Ojiako CP. Innovative health financing mechanisms: the case of Africa's unified approach to vaccine acquisition. *Health Policy and Planning*. 2024; 39(1):84-86.
42. Dickson RS, Yao D. The impact and opportunities of COVID-19 in Ghana. *Open Journal of Social Sciences*. 2020; 8(10):71-86.
43. De Foo C, Grépin KA, Cook AR, et al. Health financing policies during the COVID-19 pandemic and implications for universal health care: a case study of 15 countries. *Lancet Global Health*. 2023; 11(12):e1964-e1977.
44. Debie A, Khatri RB, Assefa Y. Contributions and challenges of healthcare financing towards universal health coverage in Ethiopia: a narrative evidence synthesis. *BMC Health Services Research*. 2022; 22(1):866.
45. African Union Commission. The Abuja Declaration: ten years on [Internet]. Addis Ababa: African Union; 2001 Sep [cited 2025 Jun 20]. Available from: <https://au.int/en/documents/20010903/abuja-declaration-ten-years>
46. Bukari C, Seth S, Yalonetzky G. Corruption can cause healthcare deprivation: evidence from 29 sub-Saharan African countries. *World Development*. 2024; 180:106630.