Research Square

Preprints are preliminary reports that have not undergone peer review.
They should not be considered conclusive, used to inform clinical practice,
or referenced by the media as validated information.

System-level barriers to HIV service delivery in five African countries: a comparative policy analysis for health systems strengthening

Davy Orago

alldao@yahoo.com

Independent Researcher

Research Article

Keywords: Health systems strengthening, HIV service delivery, health system barriers, sub-Saharan Africa, antiretroviral therapy, HIV testing, health workforce, health policy

Posted Date: March 31st, 2026

DOI: https://doi.org/10.21203/rs.3.rs-9250546/v1

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License

Additional Declarations: The authors declare no competing interests.

Abstract

Background:
Despite substantial progress in expanding HIV prevention, testing, and treatment services, sub-Saharan Africa continues to bear a disproportionate share of the global HIV burden. Progress toward epidemic control remains uneven, with persistent gaps in service delivery linked to broader health system constraints.

Objectives:
This study provides a comparative, policy-oriented analysis of health system barriers affecting HIV responses in five African countries, Central African Republic, Comoros, Guinea, Madagascar, and Burkina Faso, and identifies cross-cutting structural constraints and priority areas for health systems strengthening.

Methods:
The study was conducted as a comparative policy-oriented evidence synthesis drawing on purposively selected peer-reviewed studies and programmatic reports published between 2018 and 2025. Sources were identified through iterative searches of bibliographic databases and institutional repositories, including reports from global health agencies. Evidence was selected based on relevance to HIV service delivery and health system performance in the five study countries. Findings were analysed using a framework-based thematic approach guided by the World Health Organization health system building blocks. The analysis focused on identifying recurrent system-level barriers, cross-country patterns, and interactions between health system components affecting HIV programme implementation.

Results:
Evidence from 60 sources consistently identified interrelated barriers affecting HIV service delivery across the five countries. Key constraints included limited HIV testing coverage in rural and underserved populations, delayed treatment initiation, inadequate laboratory capacity for viral load monitoring, supply chain disruptions affecting diagnostics and antiretroviral medicines, and persistent stigma affecting service uptake. Weak health information systems and shortages of trained health workers further constrained programme performance. These barriers were observed across multiple countries, indicating shared structural weaknesses in core health system functions rather than isolated national challenges.

Conclusions:
Persistent gaps in HIV service delivery across diverse African settings are driven by interconnected health system constraints rather than programme-specific failures. Strengthening laboratory infrastructure, improving supply chain management, expanding community-based HIV testing strategies, and addressing stigma-related barriers are critical to accelerating progress toward epidemic control in resource-constrained settings. These findings highlight the need for coordinated, system-level reforms to improve HIV service delivery in resource-constrained settings and provide policy-relevant insights for governments and global health partners.

Introduction

The HIV epidemic remains one of the most significant global public health challenges. Despite considerable progress in expanding prevention, testing, and treatment services, HIV continues to disproportionately affect sub-Saharan Africa (SSA), which accounts for the majority of people living with HIV worldwide. According to the Joint United Nations Programme on HIV/AIDS (UNAIDS), approximately 39 million people were living with HIV globally in 2022, with nearly two-thirds residing in sub-Saharan Africa [1].

Over the past two decades, international investments and national HIV programmes have expanded access to antiretroviral therapy (ART), resulting in substantial reductions in AIDS-related mortality and improvements in life expectancy among people living with HIV [2]. The UNAIDS 95-95-95 targets aim to ensure that by 2030, 95% of people living with HIV know their status, 95% of those diagnosed receive sustained antiretroviral therapy, and 95% of those receiving treatment achieve viral suppression [3].

Despite these gains, progress toward epidemic control remains uneven across many countries. Health system constraints, including inadequate laboratory infrastructure, shortages of trained health workers, weak health information systems and supply chain disruptions affecting essential diagnostics and medicines, continue to undermine HIV responses [4]. These structural challenges are particularly pronounced in resource-constrained settings, where health systems often face competing priorities and limited funding.

Social and contextual barriers also play a critical role in shaping HIV outcomes. Stigma and discrimination remain major obstacles to HIV prevention and treatment efforts. Individuals may delay testing or discontinue treatment due to fear of social consequences, particularly among marginalized populations [5]. Addressing these barriers requires not only medical interventions but also broader health system and policy responses.

Health system strengthening has therefore become a critical component of effective HIV responses. The World Health Organization (WHO) conceptualizes health systems through six key building blocks: service delivery, health workforce, health information systems, access to medicines and technologies, health financing, and leadership and governance [6]. Weaknesses in any of these domains may limit the capacity of countries to deliver effective HIV services and achieve global HIV control targets.

Although many studies have examined HIV programme implementation within individual countries, fewer analyses have synthesised evidence across multiple contexts to identify shared health system barriers affecting HIV responses. Comparative analyses can provide valuable insights into common challenges and inform policy responses applicable across similar settings.

This study synthesises evidence on HIV service delivery and health system barriers across five African countries, Central African Republic, Comoros, Guinea, Madagascar, and Burkina Faso, providing a comparative policy-oriented analysis of shared structural barriers affecting HIV responses in resource-constrained settings.

To guide the analysis, this study applied the WHO system framework, which conceptualises health systems through six interrelated building blocks. These domains provide a useful structure for examining systemic constraints affecting HIV prevention, testing, and treatment services across diverse settings. The analytical framework used in this review is illustrated in Fig. 1.

This framework illustrates how HIV service delivery is shaped by interactions across key health system domains based on the World Health Organization health system building blocks. The model emphasises the interdependence of service delivery, health workforce, health information systems, access to medicines and technologies, financing, and governance. Barriers affecting HIV programme performance are conceptualised as emerging from both within and across these domains, reflecting system-level constraints rather than isolated programme failures. The framework guided the comparative analysis of cross-country patterns of health system barriers.

Understanding systemic barriers to HIV service delivery across diverse African health systems is essential for informing regional policy responses. By synthesising evidence across five countries, this review highlights cross-cutting health system constraints, and identifies policy priorities that may guide health system strengthening strategies aimed at accelerating progress toward the UNAIDS 95-95-95 targets.

By comparing health system barriers across five diverse African settings, this review identifies structural constraints that extend beyond individual national contexts. The findings provide policy-relevant insights for strengthening HIV service delivery in resource-constrained health systems across SSA.

Methods

Study design

This study was conducted as a comparative policy-oriented evidence synthesis aimed at identifying system-level barriers affecting HIV service delivery across multiple African settings. This approach is appropriate for integrating heterogeneous evidence from both peer-reviewed and programmatic sources to generate policy-relevant insights, particularly in complex health system contexts where findings are distributed across diverse forms of evidence.

Rather than estimating pooled effect sizes, the analysis focused on identifying recurrent structural patterns, cross-country similarities, and interactions between health system components influencing HIV programme performance [7].

The present review therefore adopted a flexible but structured approach to evidence identification and synthesis, prioritising analytical depth, cross-country comparability, and policy relevance.

To enhance conceptual consistency, findings were organised using the WHO health system framework domains, which provides a widely used structure for analysing service delivery, health workforce, health information systems, access to medicines and technologies, health financing, and governance [6].

Evidence identification and sources

Evidence was identified through a targeted, iterative search process designed to capture relevant literature on HIV service delivery and health system performance in the five study countries (Central African Republic, Comoros, Guinea, Madagascar, and Burkina Faso).

Searches were conducted across multiple sources, including bibliographic databases, institutional and global health organisation websites such as the WHO and UNAIDS, and grey literature sources, including national programme reports and policy documents.

The search terms combined concepts related to HIV, service delivery and health systems, barriers and constraints, and country-specific terms (Central African Republic, Comoros, Guinea, Madagascar, Burkina Faso).

The search process was iterative rather than linear, allowing refinement of search terms and sources as key themes emerged. Reference lists of relevant publications were also reviewed to identify additional sources. Consistent with policy-oriented evidence synthesis approaches, the aim was to identify a diverse and policy-relevant body of evidence to support cross-country comparison, rather than to achieve exhaustive coverage of all studies [7, 8].

Eligibility criteria and study selection

Studies and reports were included if they were published between 2018 and 2025 to capture recent and policy-relevant evidence, available in English or French, focused on HIV epidemiology, prevention, testing, treatment, or health system performance, and provided insight into structural, operational, or programmatic barriers affecting HIV service delivery in one or more of the selected countries. Both peer-reviewed studies and programmatic or institutional reports were included to ensure comprehensive coverage of policy-relevant evidence. Study selection included initial review of titles and abstracts (or executive summaries for reports) to assess relevance and a full-text review of potentially relevant sources to confirm inclusion.

Given the narrative design, formal exclusion criteria, such as risk-of-bias scoring, were not applied. However, sources were selected to ensure balance across countries, diversity of study designs, and representation of multiple health system domains.

Approach to rigour

Recognising the inherent risk of selection bias in narrative reviews, several steps were taken to enhance credibility and balance. These included both peer-reviewed and grey literature to avoid over-reliance on academic sources, use of multiple data sources, efforts to ensure representation across all five countries, despite differences in data availability, and inclusion of studies covering multiple WHO health system framework domains, rather than focusing on a single aspect of HIV programmes. These measures aimed to ensure that the synthesis reflects recurring patterns across diverse sources, rather than isolated findings from individual studies.

Analytical framework

To enhance conceptual consistency, findings were organised using the WHO health system framework domains, which comprises six domains: service delivery, health workforce, health information systems, access to medicines and technologies, health financing, and leadership and governance.

Data extraction and analysis

Relevant information from selected publications was extracted and organised into a structured matrix capturing study characteristics, health system framework(s) addressed, reported barriers or constraints, and contextual findings relevant to HIV service delivery. Data were then synthesised using a framework-based thematic approach, guided by the WHO health system framework domains.

The analytical process involved domain-level synthesis where findings were grouped according to the six WHO health system framework domains to enable structured comparison across countries. Cross-domain and cross-country analysis examined themes across frameworks and countries to identify recurrent patterns of barriers, interactions between health system components, and cross-cutting system constraints affecting HIV service delivery. This approach enabled identification of system-level patterns and interdependencies, rather than simply cataloguing individual barriers.

Country selection

The five countries included in this review, Central African Republic, Comoros, Guinea, Madagascar, and Burkina Faso, were selected to represent diverse health system contexts within SSA, while remaining relatively underrepresented in comparative HIV health systems research.

These countries reflect a range of contexts, including conflict-affected and fragile health systems (Central African Republic), small island and geographically constrained systems (Comoros), post-epidemic recovery and transitional systems (Guinea), emerging epidemic contexts (Madagascar), and resource-constrained but more stable systems (Burkina Faso). The selection was purposive, aimed at enabling comparison across analytically contrasting yet policy-relevant settings, and facilitating identification of both shared and context-specific health system barriers.

Results

Characteristics of included studies

A total of 60 peer-reviewed studies and programme reports were included, providing evidence across all six WHO health system framework domains. The included literature comprised a mix of cross-sectional studies, qualitative implementation studies, cohort analyses, modelling studies, policy reviews, and national programme reports. These sources collectively highlight structural and operational constraints affecting HIV prevention, testing, treatment, and programme monitoring across the five countries. The evidence base covered multiple domains of the WHO health system framework domains, including service delivery, laboratory capacity, health workforce availability, supply chain management, and governance.

The included literature covered all five countries, although the volume of evidence varies across settings, similar health system constraints were observed across multiple countries, indicating shared structural challenges affecting HIV service delivery in resource-constrained settings.

Results are presented in three stages. First Table 1 summarises characteristics of included studies, cross-country comparative analysis of health system barriers, and domain-specific synthesis of key system constraints.

Table 1
Characteristics of studies included in the comparative narrative review

Author	Year	Country	Study type	WHO system framework	Barrier	Context
UNAIDS	2021	Burkina Faso	Programme report	Access to medicines & technologies	Laboratory capacity	Viral load testing capacity gaps reported
UNAIDS	2019	Burkina Faso	Epidemiological report	Health information systems	Data systems	Regional disparities in ART coverage
WHO AFRO	2023	Burkina Faso	Country profile	Health information systems	Health system structure	HIV programme context
UNAIDS	2024	Burkina Faso	Country data	Health information systems	Data gaps	Updated national HIV cascade indicators
Johnson et al.	2020	Burkina Faso	Qualitative study	Service delivery	Stigma	Stigma discouraged HIV testing
Fassinou et al.	2023	Burkina Faso	Facility readiness analysis	Service delivery	Service readiness	Decline in PMTCT readiness despite high PITC availability
Linguissi et al.	2019	Burkina Faso	Narrative review	Leadership & governance	Governance	Policy progress but implementation challenges
Diallo et al.	2024	Burkina Faso	Cross-sectional study	Access to medicines & technologies	Monitoring	Suboptimal viral-load monitoring coverage
Tassembedo et al.	2024	Burkina Faso	Programme evaluation	Service delivery	Early diagnosis	Weak early infant diagnosis coverage
Sakana et al.	2022	Burkina Faso	Cross-sectional study	Service delivery	PMTCT cascade	Persistent PMTCT cascade gaps
Zoungrana-Yameogo et al.	2022	Burkina Faso	Adherence study	Service delivery	Treatment adherence	ART adherence remained suboptimal
Mennecier et al.	2024	Burkina Faso	Clinical trial	Access to medicines & technologies	Diagnostics	Point-of-care early infant diagnosis feasible
UNAIDS Joint UN Team	2020	Guinea	Country programme report	Service delivery	Testing coverage	Large first-95 gap in HIV diagnosis
UNAIDS	2021	Guinea	Programme report	Service delivery	Retention	ART retention challenges
WHO	2020	Guinea	Health system analysis	Access to medicines & technologies	Laboratory infrastructure	Weak diagnostic infrastructure
Brown et al.	2021	Guinea	Cross-sectional study	Service delivery	Late diagnosis	Late HIV diagnosis common
UNAIDS Joint Team	2020	Guinea	Programme report	Service delivery	Service expansion	ART expansion
WHO	2019	Guinea	Policy review	Health workforce	Workforce shortages	Insufficient HIV workforce
Camara et al.	2024	Guinea	Programme evaluation	Service delivery	PMTCT cascade	ART initiation improved but EID low
Breton et al.	2022	Guinea	Cohort study	Service delivery	Stigma	Stigma major driver of PMTCT loss to follow-up
Camara et al.	2025	Guinea	Qualitative study	Service delivery	Implementation barriers	Stock shortages and stigma limited community testing
WHO AFRO	2023	Guinea	Country profile	Health information systems	Health system structure	HIV programme context
UNAIDS	2024	Guinea	Country data	Health information systems	Data gaps	Recent HIV surveillance and programme indicators
WHO Scorecard	2024	Guinea	Scorecard	Health information systems	Monitoring	Cascade snapshot
Raberahona et al.	2021	Madagascar	Situational analysis	Health information	Surveillance	Weak HIV surveillance

Author	Year	Country	Study type	WHO system framework	Barrier	Context
				systems		systems
Smith et al.	2019	Madagascar	Cross-sectional study	Service delivery	Testing access	Low HIV testing uptake in rural areas
UNAIDS	2020	Madagascar	Programme evaluation	Access to medicines & technologies	Supply chain	Weak ARV supply chain
Alonso et al.	2023	Madagascar	Modelling study	Health information systems	Epidemiological monitoring	Possible transition toward generalized epidemic
Raberahona et al.	2024	Madagascar	Cohort analysis	Service delivery	Late diagnosis	Advanced HIV disease at enrolment
Patel et al.	2021	Madagascar	Programme evaluation	Service delivery	Testing access	Community testing improved uptake
WHO AFRO	2023	Madagascar	Country profile	Health information systems	Health system structure	Low ART coverage
Robinson et al.	2024	Madagascar	Screening study	Service delivery	Under-detection	HIV prevalence higher than estimates
UNAIDS	2024	Madagascar	Country data	Health information systems	Data gaps	Weak surveillance
Rakotomanana et al.	2024	Madagascar	Cross-sectional study	Service delivery	Access gaps	HIV/TB screening gaps in prisons
UNAIDS	2024	Central African Republic	Country data	Health information systems	Data gaps	Updated national HIV cascade indicators
Ferreyra et al.	2018	Central African Republic	Programme experience report	Service delivery	Conflict disruption	ART delivery disrupted in conflict settings
Ministry of Health	2018	Central African Republic	Health system report	Access to medicines & technologies	Diagnostic infrastructure	Limited laboratory capacity
Ministry of Health	2021	Central African Republic	Programme evaluation	Access to medicines & technologies	Supply chain	ART stock-outs reported
WHO	2020	Central African Republic	Health systems analysis	Health financing	Financing dependence	Heavy reliance on donor funding
Crellen et al.	2019	Central African Republic	Cohort study	Service delivery	Late care	Mortality linked to late presentation
Tekpa et al.	2024	Central African Republic	Longitudinal analysis	Service delivery	Retention	Retention on ART remains difficult
UNAIDS	2022–2023	Central African Republic	Programme report	Leadership & governance	Policy reform	New HIV law reduced testing barriers
Global HIV Coalition	2024	Central African Republic	Country report	Governance	Policy barriers	Policy barriers
Diemer et al.	2018	Central African Republic	Cross-sectional	Service delivery	Stigma	Non-disclosure
Utheim et al.	2023	Central African Republic	Cross-sectional	Service delivery	Inequality	Inequality
WHO AFRO	2023	Comoros	Country health profile	Health information systems	Surveillance	Limited HIV surveillance data
WHO	2022	Comoros	Policy analysis	Leadership & governance	Integration	Limited integration of HIV services
WHO	2023	Comoros	Programme update	Service delivery	PMTCT coverage	High PMTCT coverage but small programme
UNAIDS	2022	Comoros	Epidemiological report	Health information systems	Surveillance	Limited epidemiological data
Astawesegn et al.	2022	Comoros	Secondary analysis	Service delivery	Testing uptake	Prenatal HIV testing extremely low
Mohamed et al.	2021	Comoros	Health system	Leadership &	Political instability	Governance instability

Author	Year	Country	Study type	WHO system framework	Barrier	Context
			review	governance		affecting health system
WHO Scorecard	2024	Comoros	Scorecard	Health information systems	Monitoring	Cascade snapshot
World Bank	2019	Comoros	Project report	Financing	System strengthening	HIV service capacity
UNAIDS Laws	2024	Comoros	Policy	Governance	Legal barriers	Policy environment relevant to testing, disclosure and access

The studies summarised in Table 1 demonstrate that evidence across the five countries consistently highlights systemic barriers spanning service delivery, diagnostic capacity, workforce availability, and governance domains of the WHO health system framework domains. Although the volume of evidence varies across countries, similar operational challenges affecting HIV testing, treatment monitoring, and programme implementation were reported across multiple settings.

Cross-country comparative synthesis of health system barriers

The barriers identified across countries were mapped to the WHO health system framework domains to facilitate structured comparison of systemic constraints affecting HIV service delivery. Although the magnitude of these barriers varies across countries, several constraints were consistently reported across multiple settings, indicating systemic challenges that extend beyond individual national contexts. The synthesis revealed several key recurrent, cross-cutting health system barriers affecting HIV programme implementation across the five countries.

To enable structured comparison across countries, identified barriers were mapped to the WHO health system framework domains and synthesised into key cross-country barrier categories (Table 2).

Table 2
Cross-country health system barriers affecting HIV service delivery

WHO system framework	Barrier category	Evidence from studies	Central African Republic	Comoros	Guinea	Madagascar	Burkina Faso	No. of countries reporting	Implications
Service delivery	Limited HIV testing coverage	Low testing uptake among key populations and rural communities	✓	Moderate	✓	✓	✓	4	Expand community testing and HIV self-testing
Service delivery	Delayed treatment initiation	Late presentation and advanced HIV disease at diagnosis	✓	Moderate	✓	✓	Moderate	3	Rapid ART initiation and early diagnosis
Access to medicines & technologies	Laboratory infrastructure limitations	Limited viral load testing capacity and specimen transport systems	✓	✓	✓	✓	✓	5	Investments in diagnostic infrastructure
Access to medicines & technologies	Supply chain disruptions	Stock-outs of antiretroviral drugs and diagnostics	✓	Moderate	✓	Moderate	✓	3	Strengthen procurement and logistics systems
Health workforce	Workforce shortages	Limited numbers of trained healthcare workers	✓	Moderate	✓	✓	Moderate	3	Task shifting and workforce training
Health information systems	Weak data systems	Incomplete reporting and monitoring of HIV programmes	✓	Moderate	✓	Moderate	✓	3	Improve surveillance and digital reporting
Service delivery	Stigma and discrimination	Fear of social consequences discouraging testing and treatment	✓	Moderate	✓	✓	✓	4	Community engagement and stigma reduction
Service delivery	Financial and geographic barriers	Transport costs and long distance to health facilities	Moderate	Moderate	✓	✓	Moderate	2	Decentralization and community-based care

Key

✓ = strong evidence reported in several studies; Moderate = some evidence reported but limited or inconsistent across studies.

The comparative analysis demonstrates that several barriers are consistently reported across multiple countries, particularly those related to service delivery, laboratory and diagnostic capacity, and supply chain systems. Laboratory infrastructure limitations were the most universally reported constraint (identified in all five countries), followed by service delivery barriers including limited testing coverage and stigma-related access barriers. These findings indicate that core weaknesses in diagnostic systems and frontline service delivery represent shared structural constraints across diverse health system contexts.

Domain-specific synthesis of health system constraints

The barriers identified across the five countries span multiple domains of the WHO health system framework domains, with the most consistently reported challenges relating to service delivery, laboratory and diagnostic capacity, and supply chain management. Although the magnitude of these constraints varies across countries, similar systemic weaknesses affect HIV programme implementation across diverse health system contexts. Taken together, these findings demonstrate consistent, cross-country structural weaknesses in core health system functions, particularly diagnostic infrastructure, supply chain management, and workforce capacity, representing shared priorities for improving HIV service delivery across the five countries examined. These cross-cutting barriers manifest across key domains of HIV service delivery and health system performance, reflecting interrelated weaknesses rather than isolated programmatic gaps.

HIV testing barriers

Barriers to HIV testing were consistently reported across multiple countries and primarily reflected gaps in service delivery accessibility, particularly in rural areas and among key populations, including men who have sex with men and sex workers. Community-based testing initiatives and HIV self-testing strategies have demonstrated potential to expand coverage and reach underserved populations [9, 10].

Treatment access and continuity of care

Although antiretroviral therapy coverage has expanded across many African countries, delayed treatment initiation and poor retention in care remain significant challenges. Late diagnosis often results in patients initiating treatment at advanced stages of disease, which increases morbidity and mortality risks. Structural barriers such as transport costs, health workforce shortages and weak patient follow-up systems contribute to interruptions in care [11]. These findings highlight the interaction between service delivery constraints and health workforce limitations in sustaining continuity of care.

Laboratory capacity gaps

Constraints in laboratory and diagnostic systems emerged as the most consistently reported cross-country barrier affecting HIV programme performance. Several studies highlighted insufficient access to viral load testing services and inadequate specimen transport systems. Viral load monitoring is essential for evaluating treatment effectiveness and detecting treatment failure. Weak laboratory networks continue to hinder optimal HIV programme performance in resource-constrained settings [12].

Supply chain challenges

Supply chain disruptions affecting antiretroviral medicines and diagnostic commodities were commonly reported across the countries included in the review. Stock-outs of essential medicines and testing kits undermine treatment continuity and programme effectiveness. These disruptions reflect broader weaknesses in procurement and logistics systems within resource-constrained health systems. Strengthening procurement planning, logistics management and forecasting systems has been identified as a priority for improving HIV service delivery [13].

Stigma and social barriers

Stigma and discrimination remain critical barriers affecting HIV testing uptake and treatment adherence. Fear of social consequences, discrimination and criminalization of key populations discourage individuals from accessing HIV services. Evidence suggests that stigma reduction interventions and community engagement are essential components of effective HIV responses [5]. These barriers operate at the interface of health systems and social context, affecting both demand for and utilisation of HIV services.

Overall, the findings demonstrate that barriers to HIV service delivery across the five countries are not isolated challenges but reflect interconnected weaknesses across multiple health system domains. The convergence of service delivery limitations, diagnostic capacity gaps, supply chain inefficiencies, and workforce shortages suggests that vertical programme improvements alone are insufficient. Instead, integrated health system strengthening approaches are required to address these interdependent constraints and improve HIV programme performance across diverse resource-constrained settings.

Discussion

This comparative policy-oriented analysis demonstrates that persistent barriers to HIV service delivery across the five countries are driven by interconnected weaknesses across multiple health system domains, rather than isolated programme-level gaps. Despite differences in epidemiological context, the findings reveal consistent structural constraints, particularly in diagnostic capacity, service delivery systems, supply chain management, and workforce availability, which limit progress toward HIV epidemic control. By applying a cross-country, systems-oriented framework, this study highlights how these interdependent barriers converge to affect HIV programme performance across diverse resource-constrained settings.

The barriers identified in this study are consistent with findings from previous research examining HIV programme implementation across SSA. Recent studies examining HIV health system performance highlight persistent gaps in laboratory infrastructure, workforce capacity and health information systems that undermine service delivery and treatment outcomes in many low- and middle-income countries [14, 16].

The findings suggest that many identified barriers are not disease-specific but reflect broader structural weaknesses within health systems, including fragmented supply chains, limited diagnostic infrastructure and workforce shortages [15]. Addressing these systemic constraints is therefore essential not only for HIV programmes but also for strengthening primary healthcare systems in resource-constrained settings.

Laboratory capacity constraints remain particularly significant for HIV treatment monitoring. Viral load testing is essential for assessing treatment effectiveness and identifying treatment failure; however, access to these services remains uneven in resource-limited settings. Studies examining HIV programme implementation across Africa report that weak diagnostic infrastructure and inefficient specimen transport systems may delay treatment monitoring and clinical decision-making [12]. Strengthening laboratory networks and diagnostic capacity is therefore a critical component of effective HIV programme implementation.

Stigma and discrimination also continue to undermine HIV prevention and treatment efforts across many African settings. Evidence suggests that fear of social consequences discourages individuals from seeking HIV testing or adhering to treatment, particularly among key populations. Recent

global analyses of HIV responses emphasize that persistent inequalities, social stigma and structural barriers continue to affect access to HIV care across the region [17].

The findings also highlight the importance of strengthening health systems more broadly [15]. Weak supply chain systems, health workforce shortages and fragmented health information systems can significantly limit the effectiveness of HIV programmes. Emerging research on HIV service delivery emphasises the importance of integrating HIV programmes into broader primary health care systems and strengthening system resilience to sustain prevention and treatment services [18]. Integrated service delivery models have been shown to improve HIV testing uptake, treatment initiation and retention in care when implemented within primary healthcare settings [19].

Comparative analyses such as this study therefore provide valuable insights into shared challenges affecting HIV programmes across diverse contexts and can inform policy responses aimed at improving HIV service delivery across SSA.

Implications for health system reform

The cross-country barriers identified in this review highlight the need for coordinated health system reforms. Strengthening laboratory networks, expanding community-based HIV testing, and improving supply chain management systems represent priority investments for improving HIV programme performance across resource-constrained African settings. Regional collaboration and knowledge exchange may further support countries facing similar health system challenges.

Contribution to the literature

This study contributes to the literature in three important ways. First, it provides a comparative, cross-country synthesis of health system barriers affecting HIV service delivery across five African countries that are relatively underrepresented in existing research. Second, by applying a systems-oriented analytical framework, the study moves beyond descriptive accounts of individual barriers to identify interdependent patterns of system constraints that shape programme performance. Third, the analysis generates policy-relevant insights by linking empirical evidence to actionable priorities for health system strengthening, offering practical guidance for policymakers and global health partners working to improve HIV service delivery in resource-constrained settings.

Strengths and limitations

This review synthesises evidence from multiple sources across five African countries representing diverse epidemiological contexts. The use of the WHO health system framework domains provided a structured analytical approach for examining systemic barriers affecting HIV service delivery.

However, several limitations should be acknowledged. First, the review relied on published and publicly available literature, which may not capture all ongoing programmatic activities or unpublished implementation reports. Second, the narrative review design did not include a formal systematic review methodology or meta-analysis of study findings to allow quantitative estimation of effect sizes or pooled measures of health system barriers across countries. Third, restricting the search to English and French language publications may have excluded relevant literature. Finally, data availability varied across countries, with some programmatic reports providing limited methodological detail.

Policy implications

The findings of this study have direct implications for health system strengthening strategies in resource-constrained settings, highlighting the need for integrated investments in diagnostic infrastructure, workforce capacity, and supply chain systems to improve HIV service delivery. By identifying cross-country structural barriers, this analysis provides actionable insights for policymakers and global health partners to design coordinated, system-level interventions that accelerate progress toward HIV epidemic control.

Conclusion

Despite significant progress in expanding HIV prevention and treatment services, health system barriers continue to affect HIV responses across many African countries. Addressing these constraints will require coordinated investments in health system strengthening, including improved laboratory capacity, stronger supply chain systems, and expanded community-based HIV testing services.

Cross-country learning and regional collaboration will be critical to accelerating progress toward HIV epidemic control in sub-Saharan Africa.

Declarations

Ethics approval and consent to participate

Not applicable. This study was based on analysis of publicly available literature and programmatic reports.

Consent for publication

Not applicable.

Availability of data and materials

All data analysed during this study are included in this published article and its references.

Competing interests

The authors declare that they have no competing interests.

Funding

No specific funding was received for this study.

Authors' contributions

Davy Orago conceived the study, conducted literature review, synthesised the evidence and drafted the manuscript.

Acknowledgements

The author thanks the researchers and institutions whose published studies and reports informed this review. Their contributions to HIV research and health systems strengthening in sub-Saharan Africa made this synthesis possible.

References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS). Global HIV & AIDS statistics — Fact sheet. Geneva: UNAIDS; 2023. Available from: https://www.unaids.org
2. World Health Organization. Global HIV progress report 2022: progress towards the 95-95-95 targets. Geneva: World Health Organization; 2022.
3. Joint United Nations Programme on HIV/AIDS (UNAIDS). Fast-Track: Ending the AIDS epidemic by 2030. Geneva: UNAIDS; 2014.
4. Ford N, Vitoria M, Doherty M, Flexner C. How HIV treatment could be simplified: the way forward. J Int AIDS Soc. 2013;16(1):18472. doi:10.7448/IAS.16.1.18472
5. Stangl AL, Lloyd JK, Brady LM, Holland CE, Baral S. A systematic review of interventions to reduce HIV-related stigma and discrimination from 2002 to 2013: how far have we come? AIDS. 2013;27(Suppl 2):S269–S282. doi:10.1097/QAD.0000000000000327
6. World Health Organization. Everybody's business: strengthening health systems to improve health outcomes — WHO's framework for action. Geneva: World Health Organization; 2007.
7. Green BN, Johnson CD, Adams A. Writing narrative literature reviews for peer-reviewed journals: secrets of the trade. J Chiropr Med. 2006;5(3):101–117. doi:10.1016/S0899-3467(07)60142-6
8. Adams J, Hillier-Brown FC, Moore HJ, Lake AA, Araujo-Soares V, White M, et al. Searching and synthesising "grey literature" and "grey information" in public health: critical reflections on three case studies. BMC Med Res Methodol. 2016;16:164. doi:10.1186/s12874-016-0197-0
9. Sharma M, Ying R, Tarr G, Barnabas R. Systematic review and meta-analysis of community-based HIV testing to increase HIV testing coverage in sub-Saharan Africa. AIDS Behav. 2015;19(7):1297-1307. doi:10.1007/s10461-014-0957-2
10. Johnson CC, Kennedy C, Fonner V, Siegfried N, Figueroa C, Dalal S, et al. Examining the effects of HIV self-testing compared with standard HIV testing services: a systematic review and meta-analysis. AIDS Behav. 2017;21(11):3153-3167. doi:10.1007/s10461-016-1607-8
11. Siedner MJ, Ng CK, Bassett IV, Katz IT, Bangsberg DR, Tsai AC. Trends in late presentation for HIV care in sub-Saharan Africa: a systematic review. PLoS Med. 2015;12(9):e1001800. doi:10.1371/journal.pmed.1001800
12. Phillips AN, Cambiano V, Nakagawa F, Revill P, Jordan MR, Hallett TB, et al. Cost-effectiveness of routine viral load monitoring in low- and middle-income countries. AIDS. 2017;31(3):387-395. doi:10.1097/QAD.0000000000001308
13. Atun R, Bennett S, Duran A. When do vertical (stand-alone) programmes have a place in health systems? Copenhagen: World Health Organization Regional Office for Europe; 2008.
14. Topp SM, Chipukuma JM, Hanefeld J. Strengthening health systems for HIV responses in Africa. Glob Public Health. 2018;13(8):1045-1057. doi:10.1080/17441692.2017.1345879
15. Kruk ME, Gage AD, Arsenault C, Jordan K, Leslie HH, Roder-DeWan S, et al. High-quality health systems in the Sustainable Development Goals era. Lancet Glob Health. 2018;6(11):e1196-e1252. doi:10.1016/S2214-109X(18)30386-3
16. World Health Organization. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring. Geneva: WHO; 2021.
17. Orlando S, Silaghi LA, Cicala M, Lowole MW, Massango C, Lunghi R, et al. The global response to HIV/AIDS in sub-Saharan Africa: achievements, challenges, and perspectives for the future. Front Public Health. 2025;13:1665666. doi: 10.3389/fpubh.2025.1665666
18. Kulohoma BW, Wesonga CA. HIV response financing challenges in sub-Saharan Africa: barriers to achieving the 95-95-95 targets. Front Public Health. 2025;13:1658229. doi: 10.3389/fpubh.2025.1658229
19. Dzinamarira T, Rwibasira G, Mwila L, Moyo E, Mangoya D, Moyo P, et al. Advancing sustainable HIV services through integration in primary healthcare in sub-Saharan Africa. Healthcare (Basel). 2025;13:192. doi: 10.3390/healthcare13020192

Figures

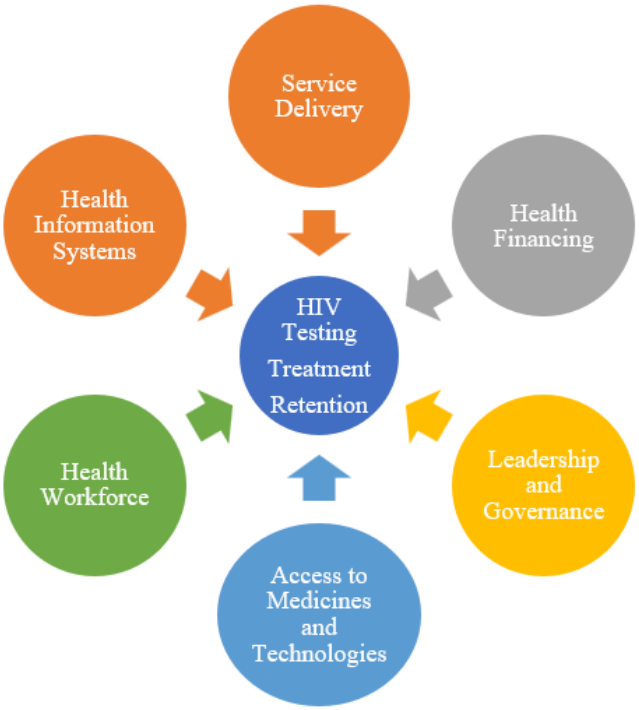


Figure 1

Conceptual framework illustrating system-level interactions affecting HIV service delivery across health system domains.