Available online on 30.05.2026 at ijmspr.com

International Journal of Medical Sciences and Pharma Research

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Open Access **Review Article**

Universal Access to HIV Testing in Africa: WHO Frameworks, Innovations, and Progress Toward Early Diagnosis

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Article Info:

Article History:

Received 11 Feb 2026
Reviewed 27 March 2026
Accepted 24 April 2026
Published 30 May 2026

Cite this article as:

Obeagu EI, John A, Universal Access to HIV Testing in Africa: WHO Frameworks, Innovations, and Progress Toward Early Diagnosis, International Journal of Medical Sciences & Pharma Research, 2026; 12(2):1-15
DOI:
http://dx.doi.org/10.22270/ijmspr.v12i2.191

Abstract

Universal access to HIV testing is fundamental to effective HIV prevention, timely treatment initiation, and epidemic control. Africa continues to shoulder the highest global burden of HIV, where delayed diagnosis remains a major driver of morbidity, mortality, and ongoing transmission. The World Health Organization (WHO) has provided sustained normative leadership through evidence-based frameworks, rights-centered policies, and programmatic innovations designed to expand HIV testing coverage and promote early diagnosis across diverse African settings. This narrative review synthesizes WHO guidance on provider-initiated and community-based testing, differentiated service delivery, and ethical standards, alongside key innovations such as HIV self-testing, integrated and dual rapid diagnostics, and mobile outreach models. Progress toward early diagnosis and the first UNAIDS targets is examined, highlighting gains in antenatal testing, male and adolescent engagement, and test-and-treat implementation. Persistent gaps—including late presentation, stigma, health system constraints, and sustainability challenges—are also discussed. The review concludes by outlining strategic priorities for strengthening equitable, data-driven, and resilient HIV testing services. Sustained implementation of WHO-led frameworks remains central to achieving universal access and ending AIDS as a public health threat in Africa.

Keywords: HIV testing, universal access, early diagnosis, World Health Organization, Africa

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Introduction

Human Immunodeficiency Virus (HIV) remains a major public health concern in sub-Saharan Africa, which accounts for more than two-thirds of the global burden of HIV infections.[1] Despite progress in treatment and prevention, many individuals in Africa remain unaware of their HIV status, hindering timely initiation of antiretroviral therapy (ART) and sustaining viral transmission within communities.[1] Early diagnosis is the first and most critical step in the HIV care continuum, and scaling up testing efforts is essential for achieving the global 95-95-95 targets set by UNAIDS—95% of people living with HIV knowing their status, 95% of those diagnosed on treatment, and 95% of those on treatment achieving viral suppression.[2] The World Health Organization (WHO) has been a key global actor in shaping the HIV response in Africa through its technical leadership, policy guidance, and programmatic support. As a specialized agency of the United Nations, WHO assists African nations in aligning their national HIV programs with evidence-based international standards, while also providing the flexibility to adapt to regional and local realities. WHO's frameworks emphasize universal access to HIV testing as a human right and public health necessity, integrating testing services into broader health system functions and community-based platforms.[3, 4]

WHO's Global Health Sector Strategies on HIV and its Consolidated Guidelines on HIV Testing Services have guided the design and implementation of HIV testing policies across Africa.[5] These frameworks promote a mix of testing modalities, including provider-initiated testing and counseling (PITC), client-initiated testing, community outreach, and HIV self-testing. This diversified approach is essential for reaching first-time testers, people in remote areas, and populations at high risk who may be deterred by stigma, discrimination, or logistical barriers from seeking facility-based care. In addition to guiding national policies, WHO has been instrumental in supporting the deployment of innovative diagnostic technologies that improve accessibility and timeliness of testing. Point-of-care diagnostics and rapid test kits recommended by WHO have become standard

tools in many African countries, particularly in rural and underserved regions. [6] Moreover, the promotion of HIV self-testing (HIVST) represents a major shift in empowering individuals to take control of their health in a private and convenient manner, further expanding testing coverage.[7] While WHO's strategic leadership is crucial in expanding HIV testing in Africa, its impact remains constrained by structural weaknesses, uneven implementation, and context-specific barriers that impede universal access.

Another critical aspect of WHO's role lies in integrating HIV testing services with other essential health programs, such as maternal and child health, tuberculosis, sexual and reproductive health, and non-communicable disease screenings.[8] These integrated service models ensure that testing becomes a routine component of comprehensive care, thereby normalizing HIV screening and reducing missed opportunities.[9] WHO also emphasizes task-shifting and community-based service delivery to address workforce shortages and enhance reach.[10] However, despite the successes achieved through WHO-supported initiatives, significant barriers remain. Stigma, limited health infrastructure, underfunding, and insufficient data utilization continue to hinder progress.[4] WHO has addressed these challenges through rights-based frameworks, technical training, and health systems strengthening. Additionally, WHO encourages the use of digital tools for monitoring and evaluating testing programs to improve accountability and responsiveness to emerging issues, such as the impact of pandemics like COVID-19 on HIV service continuity.[11] This review explores WHO's strategic contributions to scaling up HIV testing in Africa, focusing on policy leadership, diagnostic innovation, service integration, and health systems support. It also critically assesses the challenges faced and outlines future directions necessary to accelerate early diagnosis and universal access.

Aim

The aim of this narrative review is to examine the role of the World Health Organization in advancing universal access to HIV testing in Africa, with a specific focus on policy frameworks, programmatic innovations, and progress toward early diagnosis. The review synthesizes WHO normative guidance and implementation strategies to highlight achievements, identify persistent gaps, and outline priority actions required to strengthen equitable, timely, and sustainable HIV testing services across diverse African settings.

Methods

This study adopted a narrative review approach to provide a comprehensive and contextual synthesis of existing evidence on universal access to HIV testing in Africa, with particular emphasis on the leadership role of the World Health Organization. A narrative methodology was selected to allow integration of diverse sources, including policy documents, global guidelines, implementation reports, and peer-reviewed literature, which are essential for understanding health system–level and policy-driven interventions. Relevant literature was identified through targeted searches of major electronic databases, including PubMed, Scopus, and Google Scholar, using combinations of key terms such as *HIV testing*, *universal access*, *early diagnosis*, *WHO guidelines*, and *Africa*. In addition, official WHO publications, normative guidance documents, strategic frameworks, and UNAIDS reports were reviewed to capture authoritative policy perspectives and implementation experiences.

Eligible sources included peer-reviewed articles, reviews, policy briefs, and global or regional reports published primarily in English, with a focus on materials relevant to African settings. Emphasis was placed on documents addressing provider-initiated testing, community-based and differentiated testing models, HIV self-testing, integrated testing platforms, and ethical and human rights considerations. Selected sources were reviewed thematically and synthesized narratively to identify key frameworks, innovations, progress indicators, and persistent challenges. Given the narrative nature of the review, no formal quality scoring or meta-analysis was undertaken. Instead, emphasis was placed on the relevance, consistency, and policy significance of the evidence. The findings are presented descriptively and analytically to provide a coherent overview of WHO's contributions to scaling up HIV testing and advancing early diagnosis in Africa.

Regional Epidemiological Patterns and Quantitative Evidence on HIV Testing Outcomes in Africa

HIV epidemiology across Africa remains highly heterogeneous, with substantial disparities in prevalence, testing coverage, and progress toward the UNAIDS 95–95–95 targets. These differences shape how WHO-led strategies are interpreted and implemented, and they highlight the importance of region-specific frameworks rather than uniform approaches.

Eastern Africa

Eastern Africa continues to experience a moderate to high HIV burden, with adult prevalence rates averaging 3.8–5.0 percent in Kenya, Uganda, and Tanzania. By 2023, an estimated 86 percent of people living with HIV (PLHIV) in the region knew their status, yet testing coverage remains uneven across age and gender groups. In Kenya, implementation of WHO's HIV testing services (HTS) guidelines, particularly provider-initiated testing and counseling (PITC) and index testing, led to increased case identification, especially among partners of index patients. Studies from Uganda also demonstrate a rise in first-time testing among adult men following WHO-supported expansion of HIVST distribution. [12] However, critical gaps persist. Adolescent girls and young women continue to show lower testing uptake. In northern Uganda and parts of Tanzania, health facility attendance among men remains low, reducing the reach of PITC. In addition, community-led testing initiatives often struggle with inadequate supervision, logistical challenges, and fluctuating donor support. These limitations underscore the need for localized revisions of WHO strategies,

particularly in areas experiencing workforce shortages or sociocultural barriers affecting uptake. [13]

Southern Africa

Southern Africa remains the epicenter of the global HIV epidemic, with several countries reporting adult prevalence rates above 15 percent. The region has made the most substantial progress toward the 95–95–95 targets, with Eswatini, Botswana, and Namibia achieving over 95 percent status awareness among PLHIV. This success is often attributed to strong domestic investment, rapid adoption of WHO's differentiated service delivery (DSD) models, and large-scale deployment of rapid diagnostic testing. [14] Evidence from South Africa shows that WHO-aligned testing strategies, including community outreach, mobile clinics, and integration of testing into tuberculosis (TB) and antenatal care services, have significantly expanded coverage. Nonetheless, implementation studies reveal persistent inequalities: rural districts experience test kit stockouts and long turnaround times for early infant diagnosis (EID), while overburdened urban facilities face staff shortages that compromise counseling quality. Moreover, despite WHO's guidance on HIVST, linkage-to-care rates remain inconsistent, particularly among men and migrant populations who preferentially use self-testing but are less likely to seek confirmatory services. [15] These findings demonstrate that while Southern Africa benefits from strong policy adoption, the full impact of WHO-led strategies is often diluted by health system capacity constraints and geographic disparities.

West and Central Africa

West and Central Africa have the lowest HIV status awareness rates on the continent, with only 68–71 percent of PLHIV estimated to know their status as of 2023. Adult prevalence remains relatively low (1–3 percent), but the region accounts for a disproportionately high number of undiagnosed infections and late ART initiation. Nigeria, with the largest population in the region, continues to struggle with testing coverage despite major WHO-supported initiatives such as community-based mass testing and optimized PITC in high-burden facilities. [16] Implementation studies from Côte d'Ivoire and Cameroon reveal challenges including sociocultural resistance to partner notification services, weak laboratory infrastructure, and chronic shortages of trained personnel. WHO's index testing guidance, though effective in identifying undiagnosed cases in controlled settings, has also attracted controversy due to concerns about confidentiality breaches and social harm in contexts with high levels of stigma. These issues highlight the importance of balancing WHO's technical recommendations with local sociopolitical realities that shape testing behaviors. [17]

Critical Analysis of WHO Strategies Across Regions

Across all three regions, WHO-led strategies have expanded the reach and variety of HIV testing modalities. However, the real-world impact of these strategies is shaped by complex contextual factors.

Provider-Initiated Testing and Counseling (PITC):

While PITC has improved case detection in high-prevalence settings, health worker shortages and facility congestion limit its coverage. In West Africa, PITC is inconsistently implemented, and many eligible patients remain untested. These gaps reflect structural constraints that WHO guidance alone cannot resolve. [18]

HIV Self-Testing:

HIVST has opened new pathways for reaching men and adolescents, with strong evidence from Malawi, Zambia, Kenya, and South Africa showing increased uptake. However, linkage-to-care remains a persistent weakness, undermining the strategy's overall effectiveness. Without robust follow-up systems and community-based support, WHO's recommendation for national HIVST integration achieves only partial success. [19]

Index Testing and Partner Notification:

Effective in controlled environments, index testing contributes significantly to case identification in Eastern and Southern Africa. Yet, concerns about intimate partner violence, confidentiality breaches, and sociocultural resistance limit broader applicability, especially in West and Central Africa. These realities complicate WHO's assumption of uniform feasibility across settings. [20]

EID and Laboratory Guidance:

WHO's push for point-of-care EID has improved testing turnaround times in Malawi and Zambia, but implementation remains limited by technology costs, maintenance difficulties, and supply chain barriers in rural districts. In West Africa, delays of several weeks to months persist, reflecting gaps between policy ambition and infrastructural readiness. [21]

WHO's Policy Leadership and Frameworks for Scaling HIV Testing

The WHO has consistently demonstrated global leadership in the formulation and dissemination of evidence-based policies that shape the HIV response, particularly in Africa where the epidemic is most concentrated.[12] Recognizing that timely HIV testing is foundational to achieving epidemic control, WHO has developed a series of strategic documents, guidelines, and frameworks to support countries in scaling up HTS.[13] These frameworks are designed to align with evolving epidemiological trends, advances in diagnostic technologies, and the urgent need to close the testing gap among underserved populations. Central to WHO's policy leadership is the **Global Health Sector Strategy on HIV, 2022–2030**, which outlines a clear roadmap toward ending AIDS as a public health threat by 2030. The strategy emphasizes the need for universal health coverage (UHC), equity, and integration of HIV services within primary healthcare.[14] It also reinforces the 95-95-95 targets set by UNAIDS, with the first "95" focusing on ensuring that 95% of people living with HIV know their status.[15] To achieve this, the WHO strategy promotes differentiated, person-centered testing approaches that

address the diverse needs of populations at varying levels of risk and vulnerability

One of WHO's most influential tools in operationalizing HIV testing at the national level is its **Consolidated Guidelines on HIV Testing Services**, which provide comprehensive, practical recommendations on how countries can implement and scale diverse testing strategies. These guidelines advocate for PITC in clinical settings, client-initiated testing (voluntary counseling and testing), index testing, community-based testing, and HIVST.[16, 17] The guidelines stress the importance of informed consent, confidentiality, pre- and post-test counseling, and effective linkage to care and treatment services. Moreover, WHO's policy frameworks emphasize **the importance of integrating HIV testing into broader health systems** and routine services, such as antenatal care, tuberculosis screening, family planning, and sexually transmitted infection (STI) clinics.[18] This integration improves testing uptake, reduces fragmentation, and leverages existing service delivery platforms. Importantly, WHO encourages countries to adopt **rights-based approaches** to HIV testing, ensuring that services are accessible, acceptable, and non-coercive, and that individuals are protected from stigma and discrimination.[19]

At the national level, WHO supports ministries of health in contextualizing and implementing these global policies through technical assistance, policy dialogues, and capacity building. This support often includes developing or revising national HIV testing algorithms, training health workers, ensuring the availability of quality-assured test kits, and establishing quality control systems.[20] WHO also plays a pivotal role in facilitating cross-country learning through regional platforms, helping countries share best practices and adapt successful models to their own contexts. Importantly, WHO's frameworks are dynamic and regularly updated to reflect new scientific evidence and evolving testing needs. For example, the growing adoption of **HIV self-testing** in Africa was preceded by WHO's policy endorsement in 2016, which was based on rigorous evaluation of its feasibility, acceptability, and effectiveness.[19] Subsequent guidelines and implementation manuals helped countries scale up HIVST responsibly, ensuring that the expansion of testing options did not compromise test accuracy or post-test support (Table 1).

Table 1: WHO's Policy Leadership and Frameworks for Scaling HIV Testing

Framework/Policy Initiative	Key Features	Impact on HIV Testing in Africa
WHO Consolidated Guidelines on HIV Testing Services [6]	Emphasizes person-centered, rights-based approaches; includes HIV self-testing, index testing, and provider-initiated testing.	Expanded diversity and accessibility of testing modalities.
Global Health Sector Strategy on HIV (2022–2030) [14]	Sets targets aligned with the 95-95-95 goals; focuses on equity, integration, and innovation.	Provides strategic roadmap for national programs and donor alignment.
Treat All Policy (2015) [21]	Recommends universal ART for all people diagnosed with HIV, regardless of CD4 count.	Encouraged proactive testing and immediate linkage to treatment.
WHO HIV Self-Testing Guidelines (2016, updated 2019) [22]	Recommends self-testing as a complementary tool; provides guidance on distribution models and linkage.	Increased testing uptake, especially among hard-to-reach populations.
Differentiated Service Delivery (DSD) Models [23]	Promotes flexible, patient-tailored approaches to testing and care.	Strengthened access in rural and underserved communities.
Global HIV Drug Resistance Surveillance Strategy [24]	Encourages testing integration with surveillance systems.	Supports informed treatment decisions following diagnosis.
Strategic Information for Impact (SII) [25]	Framework for robust monitoring and data use for decision-making.	Enhanced program accountability and performance optimization.
WHO/AFRO Regional HIV Strategies [26]	Provides region-specific guidance considering local epidemiology and resources.	Facilitated contextualized responses aligned with country priorities.

Advancing Diagnostic Innovations for Early HIV Detection

Early and accurate diagnosis of HIV is a cornerstone of effective treatment and prevention strategies. In Africa, where barriers such as limited laboratory infrastructure, logistical constraints, and geographic inaccessibility persist, the WHO has played a pivotal role in promoting diagnostic innovations tailored to these unique challenges.[27] By endorsing, guiding, and supporting the implementation of novel and context-appropriate diagnostic tools, WHO continues to facilitate the expansion of early HIV detection across the continent.

WHO has spearheaded the scale-up of **rapid diagnostic tests (RDTs),** which have revolutionized HIV testing in resource-limited settings. These tests, requiring minimal infrastructure and offering results within 20 minutes, enable same-day diagnosis and immediate linkage to care. WHO provides detailed guidelines on test selection, quality assurance, and algorithm design to ensure accuracy, reliability, and ease of integration into national HIV testing programs.[28] By supporting countries in developing standardized testing algorithms, WHO ensures consistency and confidence in test results across different healthcare tiers.

In a significant leap forward, WHO's endorsement of **HIVST** has reshaped the landscape of early diagnosis, especially among hard-to-reach and stigmatized populations. Self-testing empowers individuals to test privately and at their convenience, thus addressing social and structural barriers that often deter clinic-based testing.[28] WHO's 2016 and 2019 guidelines on HIVST provided a clear framework for countries to safely implement and scale this approach, including protocols for test kit validation, user support, and linkage to confirmatory testing and treatment. Countries like Malawi, Kenya, South Africa, and Nigeria have since adopted national HIVST programs with WHO support, leading to increased testing coverage among men, youth, and key populations. Another critical area of WHO's innovation strategy is the promotion of **point-of-care (POC) technologies**, which facilitate decentralized and rapid diagnostics in rural and underserved areas. These include nucleic acid-based tests for EID and viral load monitoring that can be conducted at or near the point of care.(29) WHO provides guidance on the procurement, validation, and operational deployment of these technologies, as well as training health workers in their use. Early infant diagnosis, in particular, has benefited significantly from WHO's push for accessible POC platforms, ensuring that HIV-exposed infants are tested and linked to care within the first two months of life—a critical window for survival.[29]

To support quality and accuracy, WHO also leads the development of **laboratory standards and external quality assessment (EQA) schemes**, collaborating with regional reference laboratories to monitor and maintain high diagnostic standards.[30] This ensures that both traditional laboratory-based testing and decentralized modalities meet international benchmarks, minimizing false positives and negatives that can lead to patient mistrust or missed care opportunities. Furthermore, WHO has embraced the integration of **digital tools and data systems** to support diagnostic program management. Digital platforms such as DHIS2 and laboratory information systems (LIS) help countries track testing volumes, identify gaps, and optimize resource allocation.[31] These tools also facilitate real-time surveillance and reporting, enabling responsive programmatic adjustments and better forecasting of diagnostic needs (Table 2).

Table 2: Advancing Diagnostic Innovations for Early HIV Detection

Diagnostic Innovation	WHO Support/Guidance	Impact on Early HIV Detection in Africa
HIV Self-Testing (HIVST) [32]	Issued guidelines (2016, updated 2019); supports national rollouts, quality assurance, and linkage-to-care strategies.	Expanded access among hard-to-reach and stigmatized populations; increased privacy and uptake.
Point-of-Care (POC) Testing [30]	Promotes decentralized testing using rapid diagnostic tests (RDTs) and POC nucleic acid tests.	Enabled same-day diagnosis and ART initiation, especially in rural and low-resource settings.
Dual HIV/Syphilis Rapid Tests [33]	Endorsed use in antenatal care settings to improve maternal health outcomes.	Increased testing among pregnant women and reduced mother-to-child HIV transmission.
HIV Recency Assays [34]	Provides technical guidance for surveillance integration and use in monitoring incidence.	Enhanced outbreak detection and targeting of high-transmission areas.
Viral Load Testing Integration [35]	Advocates linkage of testing services with early viral load monitoring.	Improved monitoring post-diagnosis and informed early treatment decisions.
Digital Diagnostic Tools and eHealth	Supports adoption of digital platforms for tracking, referrals, and data collection.	Streamlined testing workflows and strengthened follow-up systems.
Quality Assurance for HIV Testing Services [31]	Provides tools (e.g., WHO prequalification, testing algorithms, and training modules).	Improved reliability and accuracy of HIV diagnosis across decentralized settings.
Integration with TB and Hepatitis Testing [36]	Encourages multiplex testing platforms and co-diagnosis strategies.	Facilitated comprehensive care for co-infected individuals and optimized resources.

Integration and Service Delivery Models

Effective integration of HIV testing into broader health services is central to WHO's strategy for expanding access to early diagnosis in Africa. Recognizing the fragmented nature of health systems in many African countries, WHO advocates for service delivery models

that embed HIV testing into routine care, enabling seamless, patient-centered access. This integrated approach increases testing opportunities, improves health system efficiency, and reduces stigma by normalizing HIV testing within other medical services. A major pillar of WHO's integration strategy is the **incorporation of HIV testing into maternal and child health (MCH) services**. Antenatal care (ANC) platforms offer a critical entry point for reaching pregnant women, enabling the identification and treatment of HIV-positive mothers to prevent mother-to-child transmission (PMTCT). WHO promotes PITC as a routine component of ANC visits, along with follow-up testing for infants through early infant diagnosis programs.[25] This vertical integration has been especially successful in increasing testing rates among women and improving neonatal outcomes.

Similarly, WHO supports **HIV testing integration within TB clinics**, sexually transmitted infection (STI) services, and family planning programs. Given the high co-infection rates between HIV and TB, WHO's policy mandates that all patients presenting with TB symptoms should be routinely offered HIV testing. This has improved early case detection and dual treatment, particularly in countries with high TB/HIV burden.[25] Integration with STI and reproductive health services also provides opportunities to reach sexually active populations who may not perceive themselves at risk or who avoid stand-alone HIV clinics due to stigma.[37, 38] WHO additionally encourages the **linkage of HIV testing with non-communicable disease (NCD) screening**, especially in urban health centers where the burden of hypertension, diabetes, and cancer is rising. By promoting combined screening models, WHO facilitates a comprehensive, holistic approach to care that meets multiple health needs in a single encounter. This model is particularly effective for aging populations living with HIV and for improving long-term retention in care.[39]

To ensure that integration reaches underserved and rural populations, WHO has championed **decentralized and community-based service delivery models**. These include mobile clinics, home-based testing, and outreach programs led by community health workers and civil society organizations.[40] In regions where distance, poverty, and stigma create barriers to facility-based care, these community approaches increase uptake and reduce attrition in the testing and care continuum. WHO provides technical support for the training, supervision, and quality assurance of community health workers, ensuring service standards are maintained even at the periphery of the health system. Another key dimension of WHO's integration strategy is **task-shifting and task-sharing**, where trained nurses, midwives, and lay health workers are empowered to deliver HIV testing and counseling services. This model addresses the human resource constraints plaguing many African health systems while enhancing the capacity of primary healthcare facilities. WHO's guidelines outline the competencies, supervision mechanisms, and safety protocols required for effective task-sharing, making this an important lever for scaling service delivery.[41] WHO promotes the **use of differentiated service delivery (DSD) models**, which adapt service delivery to the needs and preferences of specific population groups. For example, men, adolescents, and key populations such as sex workers and men who have sex with men often require tailored approaches. WHO's guidance on DSD includes extended clinic hours, peer-led outreach, integration with social services, and the use of digital tools to improve appointment scheduling and follow-up.[42] These flexible, patient-centered models increase acceptability, retention, and linkage to treatment post-diagnosis (Figure 1).

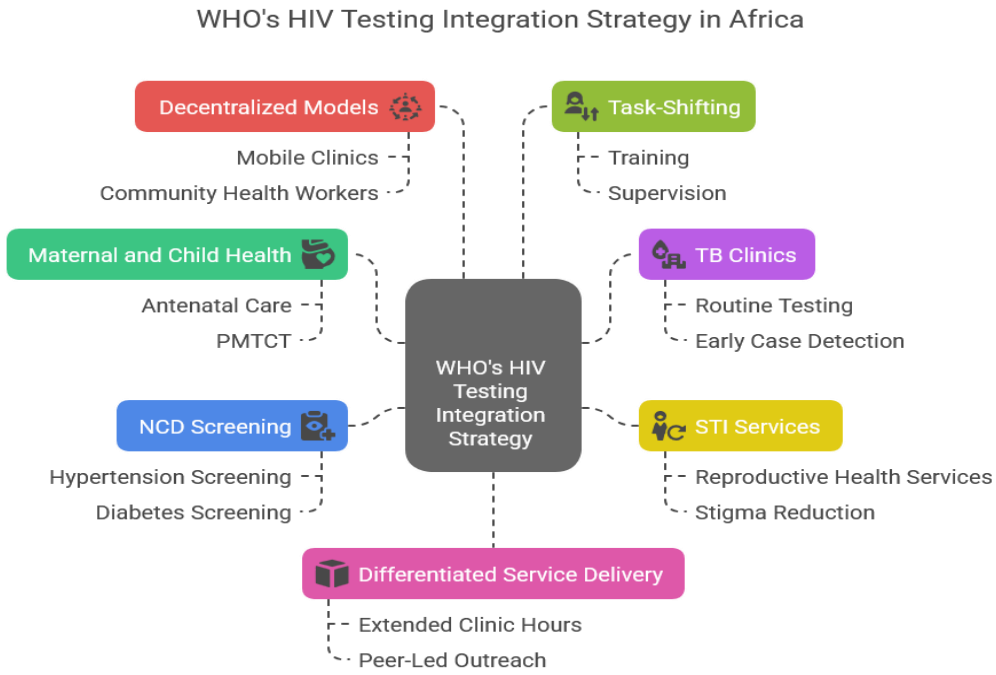

Figure 1: WHO's HIV Testing Integrations Strategy in Africa

Health System and Operational Challenges in Scaling Up HIV Testing

The effectiveness of WHO-led HIV testing strategies in Africa is often constrained by systemic and operational barriers. These challenges, frequently reported by health workers and program implementers, can significantly impede the timely delivery of testing services and undermine progress toward universal access. [36]

Health Worker Burnout and Task-Shifting Gaps

The reliance on task-shifting to lay providers and community health workers (CHWs) has expanded service reach but has also introduced challenges. High patient loads, extended working hours, and insufficient support contribute to burnout, reduced service quality, and staff attrition. Without continuous training and supervision, the potential benefits of task-shifting are not fully realized. [37]

Stockouts of HIV Test Kits

Interruptions in the supply of RDTs and HIV self-testing kits are a recurrent issue, particularly in rural and hard-to-reach areas. These stockouts delay diagnosis, reduce testing coverage, and erode community trust in health services. Strategic supply chain management and buffer stock mechanisms are often insufficiently implemented. [38]

Data Quality Concerns

Accurate reporting of HIV testing data is critical for program monitoring and resource allocation. However, underreporting, data entry errors, and occasional fabrication have been documented across several settings. Inconsistent or inaccurate data complicates evaluation of WHO strategies and hinders evidence-based decision-making. [39]

Fragile Laboratory Systems and Broken Equipment

Laboratory infrastructure deficiencies—including poorly maintained or nonfunctional equipment—limit the ability to conduct confirmatory testing and early infant diagnosis (EID). In some cases, reliance on centralized laboratories results in delays and compromised diagnostic accuracy, affecting patient outcomes. [40]

Delays in Early Infant Diagnosis

Sample transportation bottlenecks, particularly in rural areas, contribute to significant delays in EID. These delays reduce the timeliness of ART initiation in HIV-positive infants, undermining the life-saving potential of early diagnosis and treatment. [41-42]

Overcoming Barriers: Addressing Stigma, Health System, and Financing Challenges

Despite significant progress in expanding HIV testing in Africa, a complex array of barriers continues to impede universal access and early diagnosis. WHO has played an instrumental role in identifying, confronting, and mitigating these challenges, particularly those related to stigma and discrimination, fragile health systems, and inadequate financing.[43] Addressing these obstacles is vital to closing the diagnostic gap and ensuring sustainable progress toward global HIV targets. **Stigma and discrimination** remain among the most formidable barriers to HIV testing. In many African communities, HIV is still associated with moral judgment, social exclusion, and fear of disclosure, deterring individuals from seeking testing or care. WHO actively promotes a human rights-based approach to HIV services, emphasizing dignity, confidentiality, and non-discrimination.[44] Its guidelines call for the removal of punitive laws and the protection of vulnerable populations, including sex workers, men who have sex with men, people who inject drugs, and adolescents. In collaboration with UNAIDS and civil society partners, WHO supports national campaigns and training for healthcare workers to reduce stigma within healthcare settings—transforming them into safe spaces for all individuals, regardless of HIV status.[45]

Beyond stigma, **systemic weaknesses in health infrastructure** present another major hurdle. Many African countries face shortages of trained personnel, inadequate laboratory capacity, irregular supply chains for diagnostics, and limited facility coverage in remote areas.[43] WHO addresses these issues through health system strengthening initiatives, such as promoting task-shifting to nurses and community health workers, developing national testing algorithms, and investing in supply chain optimization for test kits. Technical assistance from WHO has helped countries integrate HIV testing into primary care, improve referral systems, and establish quality assurance mechanisms that bolster confidence in diagnostic services.[46] The third and often underestimated barrier is **financing**. Scaling up HIV testing requires sustainable funding for infrastructure, commodities, workforce salaries, training, and community mobilization. While many African nations rely heavily on external donors such as PEPFAR and the Global Fund, funding volatility and donor fatigue threaten program continuity.[47] WHO advocates for increased domestic financing and integration of HIV services within universal health coverage (UHC) packages to ensure sustainability. It also provides cost-effectiveness data and investment case analyses to guide national decision-makers in prioritizing HIV testing within health budgets.[48]

In response to these barriers, WHO promotes **innovative solutions and partnerships**. For instance, the use of digital health tools, such as mobile reminders and e-referrals, is being scaled up to improve follow-up and linkage to care. Similarly, public-private partnerships are being explored to support test kit production, distribution, and outreach services.[49] WHO's convening power helps to mobilize multisectoral collaborations and align efforts across donors, governments, and civil society for more coherent and effective responses.[50] Importantly, WHO encourages **community engagement as a cross-cutting strategy** to overcome stigma and demand-side barriers. Community-led advocacy, peer education, and involvement in service design help demystify HIV testing and foster trust in health systems.[51] WHO's technical guidance supports countries in creating inclusive platforms where affected

populations can participate meaningfully in decision-making processes and service delivery (Figure 2).

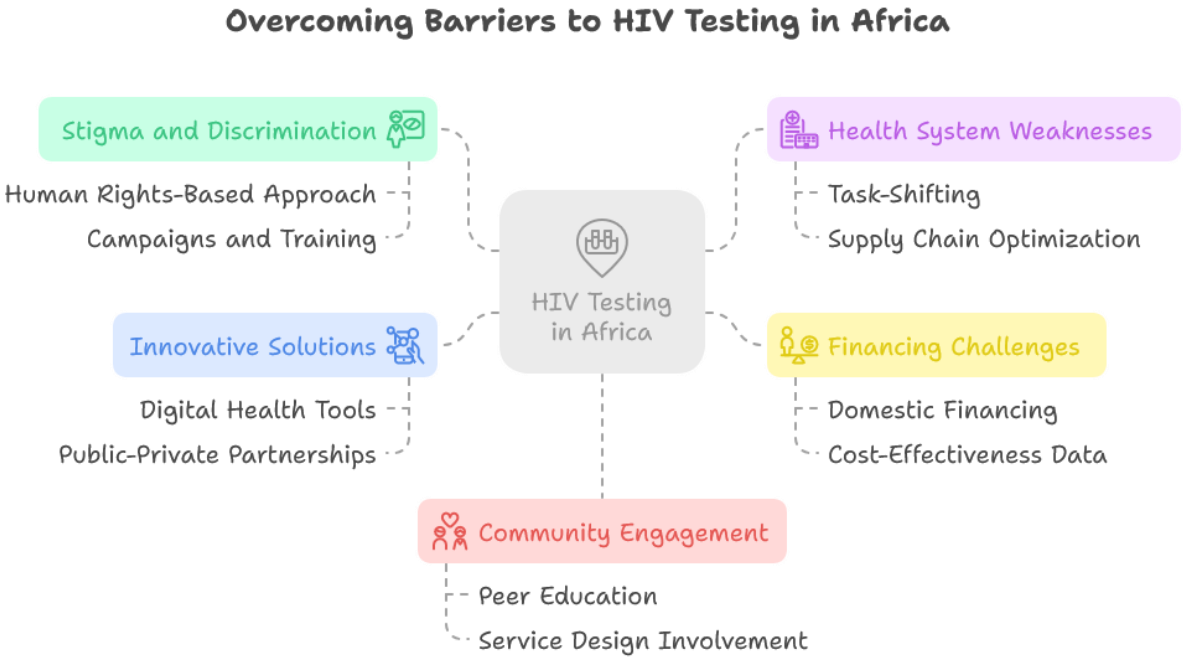

Figure 2: Overcoming Barriers in HIV Testing in Africa

Monitoring, Evaluation, and Adaptation

Monitoring and evaluation (M&E) are essential components of WHO's strategy to scale up HIV testing and ensure that interventions remain effective, equitable, and responsive to local needs. In Africa, where epidemiological trends and health system capacities vary widely between and within countries, WHO emphasizes the importance of strong M&E frameworks not only for tracking progress but also for adapting strategies to evolving realities.[52] Through technical guidance, capacity building, and data systems development, WHO supports African nations in institutionalizing M&E practices that are both robust and context-appropriate. At the core of WHO's M&E approach is the establishment of **standardized indicators and reporting systems** to measure HIV testing coverage, yield (positivity rate), linkage to care, retesting uptake, and population-level access.[53] These metrics enable health ministries and partners to assess the reach and effectiveness of testing interventions across age groups, genders, and key populations. WHO collaborates with UNAIDS and other agencies to harmonize these indicators within national HIV strategic frameworks and align them with the Global AIDS Monitoring (GAM) system, ensuring consistent data reporting across countries.[25, 54]

WHO has also promoted the **strengthening of health information systems,** such as the District Health Information Software 2 (DHIS2) platform, to facilitate real-time data capture, aggregation, and analysis.[55] By encouraging the integration of HIV testing data into routine health management information systems (HMIS), WHO helps countries move away from fragmented, paper-based systems and toward digital platforms that enable timely, data-driven decision-making.[56] These systems are especially useful for identifying service delivery gaps, geographic disparities, and trends over time. In response to data quality challenges, WHO supports countries in establishing **data validation, quality assurance, and supervision protocols.** These include regular data audits, cross-checks between testing registers and laboratory logs, and training of health workers in data entry and interpretation. WHO also champions the use of dashboards and scorecards that visually summarize key indicators, facilitating easier performance monitoring and accountability at both facility and national levels.[25] Another critical area is **adaptive management**, where program designs are modified based on M&E findings.[57] WHO advocates for a learning-oriented culture within HIV programs—one in which poor-performing interventions are restructured and successful strategies are scaled. For instance, if data reveal low uptake of HIV self-testing among adolescents, WHO may recommend targeted outreach using peer educators or mobile-based delivery. This agile approach ensures responsiveness to local barriers, preferences, and epidemiological shifts.[58]

To complement national efforts, WHO supports the **implementation of periodic evaluations and population-based surveys,** such as the Population-based HIV Impact Assessments (PHIA), Demographic and Health Surveys (DHS), and AIDS Indicator Surveys (AIS).[59-61] These large-scale data sources offer insights into testing trends, behavioral determinants, and population-level impact, enabling countries to recalibrate their HIV strategies in line with real-world outcomes. Importantly, WHO emphasizes the inclusion of **community-led monitoring,** where civil society and

affected populations participate in evaluating service accessibility, acceptability, and human rights adherence.[62] These efforts promote transparency, build trust, and ensure that service users have a voice in how HIV testing programs are designed and delivered.[62] WHO provides technical support for integrating community feedback mechanisms into national M&E plans and for strengthening the interface between service providers and communities (Figure 3).

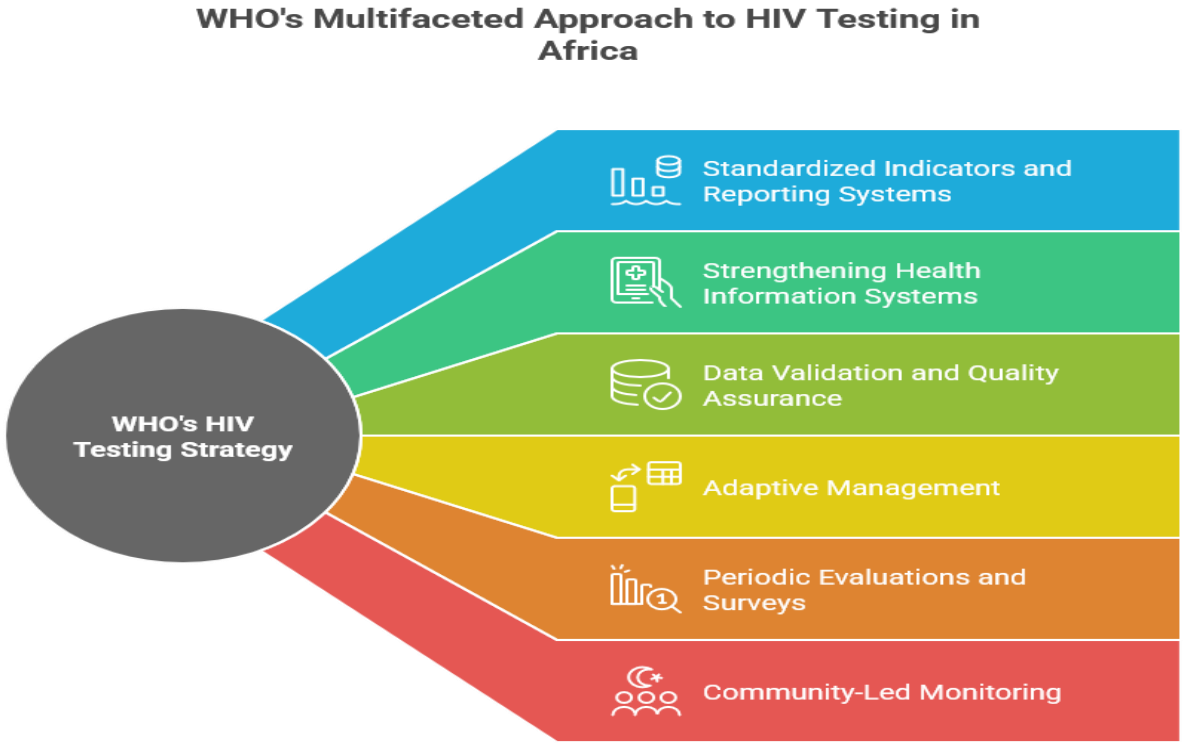

Figure 3: WHO's HIV Testing Strategy

Community and Stakeholder Perspectives in HIV Testing Scale-Up

Understanding the experiences of PLHIV, CHWs, youth-led organizations, key population networks, and civil society actors is essential to contextualize the successes and limitations of WHO-led HIV testing strategies. These perspectives provide insights into barriers, facilitators, and the social dynamics that influence uptake and linkage-to-care. [56]

Experiences of People Living with HIV

PLHIV often highlight stigma, fear of disclosure, and concerns about confidentiality as major deterrents to testing. Despite the availability of community-based and self-testing initiatives, many individuals remain hesitant due to social judgment or previous negative interactions with health systems. This underscores the need for culturally sensitive counseling, privacy safeguards, and patient-centered approaches. [57]

Community Health Workers

CHWs play a pivotal role in implementing WHO recommendations at the grassroots level. Their experiences reveal challenges such as high workloads, limited training, and occasional stockouts of testing supplies. CHWs often serve as bridges between formal health systems and communities, and their insights emphasize the importance of adequate support, supervision, and recognition to sustain testing initiatives. [58]

Youth-Led Organizations and Key Population Networks

Young people and key populations (including men who have sex with men, sex workers, and people who inject drugs) face unique barriers. Youth-led organizations report that conventional testing approaches may not be accessible or acceptable to adolescents and young adults due to stigma, mobility, or restrictive clinic hours. Similarly, key population networks note that fear of criminalization or discrimination often prevents engagement with formal services, highlighting the need for peer-led outreach and inclusive service models. [59]

Civil Society Actors

Civil society organizations emphasize the importance of advocacy, community mobilization, and accountability in HIV testing scale-up. Their experiences demonstrate that effective programs require alignment with local needs, continuous monitoring, and flexibility to adapt WHO guidance to diverse sociocultural contexts. [60]

Implications for Policy and Practice

Integrating these lived experiences into program design reveals critical gaps in the translation of WHO strategies to practice. Stigma reduction, trust-building, service acceptability, and linkage-to-care must be prioritized

alongside technical guidance. Programs that actively involve PLHIV, CHWs, youth networks, and civil society in planning and implementation tend to achieve higher uptake, better retention, and more equitable access across populations. [61]

Critical Analysis of WHO Strategies in the Context of African Health Systems

Despite WHO's pivotal role in shaping HIV testing frameworks across Africa, a significant gap persists between global strategies and the complex realities of national health systems. While WHO's guidance is designed for broad applicability, the success of these strategies in Africa is often constrained by resource limitations, infrastructural fragility, sociocultural barriers, and variations in political commitment. This disconnect underscores the need for more context-sensitive implementation approaches that account for the heterogeneity of African settings, from well-resourced urban centers to remote, underserved regions (Table 3). [60]

Table 3: Summary of WHO-Led Interventions, Technical Guidance, Diagnostic Tools, and Implementation Support Mechanisms Across African Countries

WHO Intervention / Guidance	Description	Countries Implementing	Implementation Support Mechanisms	Reported Outcomes / Limitations
HIV Testing Services (HTS) Consolidated Guidelines	Standardized protocols for provider-initiated testing, index testing, self-testing, and HIV testing in key populations.	Regional adoption across Eastern, Southern, West/Central Africa.	Policy adaptation workshops, national HTS guideline updates, training modules for health workers.	Improved standardization of testing pathways; challenges with task-shifting acceptance, variable adoption of index testing due to ethical concerns.
WHO Prequalification of HIV Rapid Diagnostic Tests (RDTs)	Ensures quality-assured test kits for screening and confirmatory algorithms.	Widely used in Malawi, Tanzania, South Africa, Nigeria.	Procurement assistance, quality assurance frameworks, lot verification programs.	Increased diagnostic accuracy; inconsistent supply chains, occasional stock-outs, cold-chain issues for certain kits.
HIV Self-Testing (HIVST) Guidance and Scale-Up Support	Recommends HIVST as a complementary strategy for reaching men, adolescents, and key populations.	Large-scale adoption in Malawi, Zambia, South Africa, Nigeria; pilot phases elsewhere.	WHO technical briefs, demand-creation toolkits, implementation research support.	Marked increase in testing uptake among men; concerns over linkage to care, low return rates for confirmatory testing.
Differentiated Testing Models (Community-Based, Mobile, Door-to-Door)	Supports community-centered testing tailored to local contexts.	Tanzania, Kenya, Uganda, Lesotho, eSwatini, Zimbabwe.	Training for community health workers, mobile clinic deployment, integration with HIV prevention campaigns.	Expanded reach in remote areas; sustainability concerns, volunteer burnout, funding gaps.
Integrated Testing Approaches (HIV/TB, HIV/Malaria, HIV/Antenatal Care)	Promotes integration of HIV testing within high-burden disease programs.	South Africa, Malawi, Mozambique, Nigeria.	Diagnostic algorithm harmonization, point-of-care toolkits, provider training.	Increased case detection in ANC and TB clinics; workflow overload and weak cross-program coordination reported.
WHO Early Infant Diagnosis (EID) Framework	Supports scale-up of PCR testing, point-of-care EID, and sample transport networks.	Lesotho, Rwanda, Malawi, Tanzania, South Africa, Nigeria.	Specimen transport optimization, POC EID validation, training for lab personnel.	Significant reduction in turnaround times; persistent bottlenecks in reagent supply and follow-up of positive infants.

Digital Health Solutions for HIV Testing	Use of electronic registers, connectivity for POC devices, and digital reporting systems.	Kenya, Uganda, South Africa, Rwanda.	Digital architecture design, data governance guidelines, interoperability support.	Improved data reporting accuracy; issues with internet stability, device maintenance, and data privacy concerns.
Strategic Information and Surveillance Support	Strengthening routine monitoring, incidence surveillance, and recency testing.	Ethiopia, Zambia, Nigeria, South Africa.	Surveillance system redesign, training on recency assays, data-use workshops.	Better incidence estimates; variable country capacity, occasional misclassification with early recency assays.
WHO-Led Implementation Research Platforms	Supports operational research to improve testing uptake and quality.	Malawi, Zimbabwe, Tanzania.	Technical mentorship, ethics guidance, multi-country study coordination.	Provided evidence for scaling HIVST and community testing; limited translation of findings into policy in some countries.
Partnership and Financing Mechanisms	Coordination with PEPFAR, Global Fund, Africa CDC for scale-up.	All regions.	Joint planning missions, grant proposal review support, health-system strengthening.	Improved resource alignment; persistent reliance on external funding threatens long-term sustainability.

Global Guidance vs Ground-Level Realities

WHO's universal testing recommendations rely heavily on robust health system capacity, including consistent test kit supply chains, adequately trained personnel, efficient data systems, and strong community trust. However, many African countries continue to struggle with chronic stockouts, workforce shortages, and fragmented referral pathways. As a result, the operationalization of WHO policies often falls short of intended outcomes. Health workers frequently report overwhelming workloads, while facilities lack functioning diagnostic equipment, a challenge that undermines early infant diagnosis and viral load monitoring. These gaps reveal structural constraints that must be addressed before global policies can translate into effective local practice. [61-62]

Case Studies: Successes and Shortcomings

Experiences from Malawi, Tanzania, South Africa, and Nigeria illustrate the diversity of outcomes associated with WHO's guidance.

In **Malawi**, the incorporation of HIVST into national policy led to impressive uptake among men and first-time testers. Yet, linkage-to-care remained inconsistent, with rural communities reporting delays in confirmatory testing and ART initiation due to transportation challenges and limited facility capacity. [14]

Tanzania achieved wide adoption of PITC in high-burden districts, supported by WHO's differentiated testing guidance. Still, health worker fatigue and insufficient supervision compromised the quality of counseling sessions and documentation accuracy. Adolescents in particular reported feeling rushed or stigmatized during facility-based testing encounters. [15]

In **South Africa**, a robust laboratory system and substantial domestic investment enabled successful implementation of WHO's EID and rapid testing recommendations. However, inequities persist between urban provinces and rural areas such as the Eastern Cape, where test kit shortages, weak data systems, and infrastructural delays undermine universal access to testing. [2]

Nigeria demonstrates how sociopolitical and logistical constraints can impede the operationalization of WHO policies. Despite large-scale adoption of community outreach and HIVST, conflict-affected zones in the northeast continue to experience severely limited testing coverage. Health worker insecurity, population displacement, and periodic supply chain disruption have all hindered implementation. [3] These case studies reveal that while WHO frameworks provide valuable structure, meaningful success depends on country-specific adaptability and the resilience of local systems.

Failures, Bottlenecks, and Controversies

Several implementation bottlenecks and controversies reflect broader weaknesses in translating WHO recommendations into practice. Key challenges include:

Stockouts and supply chain failures, particularly for HIV test kits and EID consumables, which disrupt testing continuity across multiple countries.

Data quality issues, including underreporting, delayed reporting, and occasional fabrication, which compromise surveillance accuracy and hinder evidence-based decision-making.

Concerns around HIVST, including inadequate follow-up support, risk of social harm, and poor linkage-to-care

infrastructure, especially in rural and low-literacy communities.

Overreliance on donor-driven programs, raising concerns about sustainability and leaving countries vulnerable when funding cycles shift.

Challenges with partner-notification services, where cultural norms, stigma, and gender dynamics limit the effectiveness of WHO's recommendations. [20]

These failures highlight that global guidance alone cannot resolve deep-rooted systemic issues.

Community Perspectives and Lived Realities

Voices from people living with HIV, community health workers, and frontline implementers reveal stark differences between policy intentions and everyday experiences. Community members often cite fear of stigma, mistrust of health facilities, and concerns about confidentiality as major barriers to testing. In rural Malawi and Tanzania, individuals reported walking long distances to reach testing sites, only to find that test kits were unavailable. Youth groups in South Africa described discomfort with facility-based testing, noting judgmental attitudes and inadequate privacy. Key populations in Nigeria highlighted the value of peer-led testing but expressed frustration with inconsistent outreach and insufficient psychosocial support after diagnosis. [61-62] Community health workers likewise face barriers that WHO policies rarely address directly. Many report high workloads, emotional burnout, safety concerns in conflict-prone areas, and limited training in managing sensitive encounters such as partner notification or adolescent counseling. Their experiences demonstrate that successful HIV testing relies not only on clinical tools but also on human relationships, trust, and sustained community engagement.

Evaluating WHO Strategies: Feasibility, Sustainability, and Measurable Outcomes

Assessing WHO-led HIV testing strategies requires moving beyond technical guidance to examine how policies translate into practice, their sustainability over time, and the tangible outcomes achieved across diverse African contexts.

HIV Self-Testing

WHO's recommendation for HIVST has been widely adopted to expand access, particularly among populations reluctant to engage with conventional health facilities. In countries like South Africa and Malawi, HIVST has demonstrated high feasibility, with uptake particularly strong among men and urban youth. However, challenges persist in distribution logistics, cost management, and ensuring consistent availability of test kits. Acceptability is influenced by literacy levels, privacy concerns, and perceived reliability of results. Furthermore, concerns about social harm, including coercion or unintended disclosure, highlight the need for complementary counseling services. Linkage-to-care remains a critical bottleneck; without active follow-up mechanisms, individuals who test positive may not promptly access confirmatory testing and treatment. [57]

Provider-Initiated Testing and Counseling

PITC in clinical settings has shown measurable success in increasing testing coverage among patients attending health facilities. Its feasibility is supported by existing infrastructure and routine patient interactions, but sustainability is limited by health worker shortages and burnout. Evidence from Tanzania and Nigeria indicates that while initial coverage targets are achievable, long-term retention and repeat testing require ongoing support and resource allocation. [58]

Community-Based Testing Programs

Door-to-door and mobile testing campaigns are effective in reaching rural and marginalized populations. Feasibility is high when local CHWs are engaged and culturally tailored approaches are employed. Sustainability depends on continuous funding, robust supply chains, and integration with broader health programs. Measurable outcomes, such as increased diagnosis rates and linkage to care, have been positive in Malawi and Kenya; yet in some areas, inconsistent follow-up undermines long-term impact. [59]

Integration with Maternal and Child Health Services

Integrating HIV testing with antenatal and immunization services enhances early infant diagnosis and timely ART initiation. This strategy is both feasible and cost-effective, leveraging existing health service platforms. However, delays in sample transport, laboratory capacity limitations, and intermittent stockouts challenge sustainability. Outcomes are strongest where supply chains are optimized and data management systems function reliably, as observed in pilot programs in Botswana and South Africa. [60-61]

Strategic Information Systems

WHO's guidance on standardized data collection and reporting is essential for monitoring program performance. Feasibility is contingent on digital infrastructure and trained personnel, while sustainability requires ongoing investment in software, hardware, and human resources. Where successfully implemented, as in Rwanda and parts of Kenya, measurable outcomes include improved surveillance, timely decision-making, and targeted resource allocation. Yet, underreporting and data inconsistencies remain barriers in several countries. [62]

Conclusion

Universal access to HIV testing remains the indispensable entry point to HIV prevention, treatment, and long-term epidemic control in Africa. Through sustained normative leadership, the World Health Organization has shaped rights-based, evidence-driven frameworks that have fundamentally transformed HIV testing delivery across the continent. The expansion of provider-initiated testing, community-based approaches, differentiated service delivery, and innovative tools such as HIV self-testing and integrated diagnostics has substantially increased testing coverage and accelerated progress toward early diagnosis. Despite these achievements, late presentation to care, persistent

stigma, health system limitations, and inequities affecting men, adolescents, and key populations continue to impede optimal impact. Addressing these challenges will require intensified data-guided targeting, deeper integration of HIV testing within universal health coverage, stronger community engagement, and sustained domestic financing to ensure programmatic resilience. As Africa advances toward the 95–95–95 targets and the broader goal of ending AIDS as a public health threat, continued implementation and adaptation of WHO-led frameworks will remain central. Strengthening equitable, accessible, and timely HIV testing services is not only a public health necessity but also a critical determinant of social justice and health security across the continent.

Provenance and peer review: Not commissioned, externally peer-reviewed

Conflicts of Interest: The author declares no conflict of interest

Sources of Funding: No fund was received to write this review paper

Ethical Approval: Not applicable

Consent: Not applicable

List of Abbreviations

AIDS – Acquired Immunodeficiency Syndrome

ART – Antiretroviral Therapy

ARV – Antiretroviral

CDC – Centers for Disease Control and Prevention

CD4 – Cluster of Differentiation 4 (a type of T-cell)

DOT – Directly Observed Therapy

HCT – HIV Counseling and Testing

HIV – Human Immunodeficiency Virus

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