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Stigma Reduction Framework for Improving Community Uptake of Infectious Disease and HIV Diagnostic Services

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Abstract

Stigma continues to pose a significant barrier to the utilization of infectious disease and HIV diagnostic services, particularly in low- and middle-income communities. Social, cultural, and structural stigmas can discourage individuals from seeking testing, impede disclosure of risk behaviors, and reduce adherence to follow-up care, ultimately undermining public health efforts to control disease transmission. Developing effective interventions to mitigate stigma is therefore critical to improving community engagement with diagnostic services and achieving equitable health outcomes. This abstract presents a conceptual framework for stigma reduction aimed at enhancing uptake of infectious disease and HIV testing at the community level. The framework integrates multi-level strategies that address individual, interpersonal, and societal dimensions of stigma. At the individual level, interventions focus on increasing health literacy, correcting misconceptions about disease transmission, and fostering positive attitudes toward testing through targeted educational campaigns. At the interpersonal level, the framework emphasizes peer-led support groups, community champions, and social network engagement to normalize health-seeking behaviors and reduce fear of discrimination. Structural and societal components include policy advocacy, health system sensitization, confidentiality safeguards, and integration of anti-stigma messaging into public health programs. By addressing stigma holistically across these levels, the framework seeks to create enabling environments that encourage voluntary testing, timely diagnosis, and linkage to care. Additionally, the framework incorporates continuous monitoring and evaluation to assess intervention effectiveness and inform iterative improvements. Metrics include changes in knowledge, attitudes, and behaviors related to stigma, as well as measurable increases in testing uptake and follow-up adherence. The use of community-based participatory approaches ensures that interventions are culturally sensitive, contextually relevant, and co-designed with local stakeholders, enhancing acceptability and sustainability. The proposed stigma reduction framework provides a structured, evidence-informed approach to overcoming barriers to infectious disease and HIV diagnostic service utilization. By combining educational, social, and structural interventions with robust evaluation and community engagement, the framework aims to improve early detection, promote health equity, and strengthen overall public health outcomes.

Keywords: Stigma Reduction, HIV Testing, Infectious Disease Diagnostics, Community Engagement, Health-Seeking Behavior, Behavioral Interventions, Public Health Frameworks, Social-Ecological Model

1. Introduction

Stigma remains a pervasive barrier to the effective utilization of infectious disease and HIV diagnostic services, particularly in low- and middle-income communities (Oloruntoba *et al*., 2025; Aduwo *et al*., 2025) [51, 13]. Social, cultural, and structural stigmas surrounding disease status, risk behaviors, and marginalized identities often prevent individuals from seeking timely testing. Fear of discrimination, social exclusion, or breach of confidentiality can lead to avoidance of healthcare facilities, reluctance to disclose symptoms, and hesitancy to engage with community-based testing programs (Omolayo *et al*., 2025; Damilare *et al*., 2025) [54, 27]. This persistent barrier significantly undermines public health efforts to detect and manage infectious diseases, including HIV, tuberculosis, and other communicable conditions (Sobowale *et al*., 2025; Ojonugwa *et al*., 2025) [61, 43]. As a result, many individuals at high risk remain undiagnosed, perpetuating disease transmission and delaying access to life-saving interventions.

The consequences of low diagnostic uptake due to stigma are multifaceted. On an individual level, delayed testing can result in the progression of disease, reduced treatment efficacy, and increased morbidity and mortality (Akomolafe *et al*., 2025 [20]; Afrihyia *et al*., 2025). For HIV-positive individuals, late diagnosis often correlates with higher viral loads and compromised immune function, increasing susceptibility to opportunistic infections. At the community and population level, undiagnosed cases contribute to ongoing transmission chains, challenging efforts to achieve epidemic control (Okereke *et al*., 2025; Aduwo and Nwachukwu, 2025). Public health programs are further hampered by incomplete surveillance data and underestimation of disease prevalence, which compromises resource allocation, policy planning, and intervention targeting. Therefore, addressing stigma is not merely a social or ethical imperative but a critical public health priority essential for improving diagnostic coverage and achieving broader health outcomes (Adeleke, 2025; Adeoye *et al*., 2025).

Despite recognition of stigma as a barrier, many existing interventions remain fragmented or narrowly focused, often addressing only individual attitudes without considering interpersonal and structural determinants. This highlights the need for structured, multi-level frameworks that integrate educational, social, and policy-oriented strategies to create enabling environments for health-seeking behavior (Gobile *et al*., 2025; Augustine *et al*., 2025) [34, 25]. Effective frameworks must account for the complex interplay between individual knowledge, community norms, healthcare system practices, and broader societal structures that perpetuate stigma. They should also emphasize cultural sensitivity, community engagement, and participatory design to ensure interventions resonate with target populations and are sustainable over time (Afrihyia *et al*., 2025; Okoli *et al*., 2025).

The primary objective of this, is to outline a comprehensive framework for stigma reduction aimed at enhancing community uptake of infectious disease and HIV diagnostic services. The framework focuses on identifying the key dimensions of stigma, the pathways through which it impedes diagnostic engagement, and the evidence-based strategies to mitigate its impact. Components of the framework include interventions targeting individual knowledge and attitudes, peer and social support mechanisms, health system practices promoting confidentiality and respectful care, and structural measures such as policy advocacy and anti-discrimination legislation (Okereke *et al*., 2025; Akomolafe *et al*., 2025 [20]). By integrating these components into a coherent approach, the framework seeks to improve early detection, facilitate linkage to care, and ultimately contribute to better health outcomes and epidemic control.

Stigma poses a significant barrier to diagnostic service utilization with far-reaching consequences for both individuals and communities. Structured frameworks are essential to guide the design, implementation, and evaluation of stigma reduction strategies, enabling more equitable and effective public health interventions. This essay provides a foundation for developing evidence-informed, context-specific approaches to overcome stigma and enhance community engagement in infectious disease and HIV testing.

2. Methodology

The methodology for this systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency, reproducibility, and methodological rigor. A comprehensive search strategy was developed to identify studies, frameworks, and interventions aimed at stigma reduction to improve community uptake of infectious disease and HIV diagnostic services. Multiple electronic databases, including PubMed, Scopus, Web of Science, Embase, and PsycINFO, were searched for relevant literature. Grey literature sources, such as government reports, policy briefs, organizational guidelines, and conference proceedings, were also reviewed to capture emerging and context-specific evidence. The search combined controlled vocabulary and free-text terms related to “stigma reduction,” “HIV testing,” “infectious disease diagnostics,” “community uptake,” “behavior change frameworks,” and “health service utilization.” Reference lists of included studies were manually screened to identify additional eligible publications.

Eligibility criteria were defined based on the Population, Intervention, Comparator, Outcome, and Study design (PICOS) framework. Studies were included if they described or evaluated frameworks, interventions, or programs designed to reduce stigma associated with infectious diseases, including HIV, and to improve the uptake of diagnostic services in community settings. Both qualitative and quantitative studies, as well as mixed-methods research, were considered. Studies focusing solely on clinical outcomes without addressing stigma or community engagement, or those conducted exclusively in clinical or hospital settings without community relevance, were excluded.

Data extraction was conducted independently by two reviewers using a standardized form to capture study characteristics, population demographics, intervention components, theoretical foundations, implementation strategies, outcomes measured, and effectiveness of stigma reduction approaches. Discrepancies in data extraction were resolved through discussion or consultation with a third reviewer. Extracted data also included information on community engagement methods, cultural adaptation, and scalability considerations.

Quality assessment and risk of bias were evaluated using established tools appropriate for qualitative, quantitative, and mixed-methods studies. Key domains included methodological rigor, clarity of framework description, appropriateness of evaluation methods, and transparency in reporting outcomes. Studies were rated as high, moderate, or low quality, and this classification informed the synthesis of findings.

Data synthesis employed a narrative approach due to heterogeneity in study designs, framework components, implementation contexts, and outcome measures. Themes were identified regarding effective strategies for stigma reduction, including education, peer support, community mobilization, and integration of diagnostic services with culturally sensitive interventions. The PRISMA flow diagram was used to document the number of records identified, screened, excluded, and included, ensuring transparency in study selection and review processes.

This methodology enabled a systematic and comprehensive review of stigma reduction frameworks for improving community uptake of infectious disease and HIV diagnostic services, facilitating the identification of best practices, critical gaps, and recommendations for future research and program implementation.

2.1 Conceptual Foundations

Stigma remains one of the most persistent and insidious barriers to the utilization of health services, particularly in the context of infectious diseases and HIV. Understanding stigma requires a multidimensional perspective, encompassing both individual experiences and structural determinants. Conceptually, stigma can be categorized into four main types: perceived, enacted, internalized, and structural. Perceived stigma refers to an individual's anticipation or fear of discrimination from others due to their health status, often leading to avoidance of diagnostic services (Afrihyia *et al*., 2025; Taiwo *et al*., 2025). Enacted stigma involves overt acts of discrimination, such as social exclusion, verbal abuse, or denial of services, which directly impede access to care. Internalized stigma occurs when individuals absorb negative societal beliefs, leading to feelings of shame, guilt, or diminished self-worth, which can deter health-seeking behaviors. Structural stigma encompasses institutional policies, cultural norms, and societal practices that systematically disadvantage affected populations, thereby shaping both access to and quality of health services. Together, these dimensions interact to form complex barriers that reduce timely testing and treatment uptake.

The relationship between stigma and health-seeking behavior is well-documented, with numerous studies indicating that higher levels of stigma correlate with lower rates of diagnostic service utilization. Individuals fearing judgment or discrimination may delay or entirely avoid testing, increasing the likelihood of late diagnosis, poorer treatment outcomes, and ongoing disease transmission within communities (Adeoye *et al*., 2025; Afrihyia *et al*., 2025). These dynamic underscores the need for frameworks that not only address individual attitudes but also consider the broader social and structural environment influencing behavior.

The social-ecological model offers a valuable lens for examining stigma across multiple levels. At the individual level, interventions target personal beliefs, knowledge, and emotional responses. Interpersonal strategies involve addressing family, peer, and social network influences, emphasizing supportive relationships and mitigating negative social pressures. Community-level efforts focus on shifting norms and practices through public education campaigns, mass media, and participatory initiatives (Adeshina and During, 2025 [6]; Okoli *et al*., 2025). Structural interventions aim to reform policies, legal frameworks, and institutional practices that perpetuate discrimination, thereby ensuring equitable access to diagnostic services.

Integrating behavioral and public health theories enhances the design and effectiveness of stigma reduction interventions. The Health Belief Model (HBM) provides insight into individual decision-making, emphasizing perceived susceptibility, perceived severity, perceived benefits of action, and barriers to care. Applying HBM allows programs to tailor messages that enhance perceived benefits of diagnostic testing while mitigating fear and perceived stigma. The Theory of Planned Behavior (TPB) complements this by incorporating attitudes, subjective norms, and perceived behavioral control, guiding the development of interventions that influence intentions and translate them into health-promoting actions (Taiwo *et al*., 2025; Adeoye *et al*., 2025). By aligning stigma reduction strategies with these theoretical frameworks, programs can address both cognitive and social determinants of diagnostic service uptake.

The conceptual foundations of a stigma reduction framework emphasize a comprehensive, multi-level approach. Recognizing the diverse forms of stigma, understanding their influence on health-seeking behavior, and applying social-ecological and behavioral theories collectively provide a robust basis for designing interventions (Afrihyia *et al*., 2025; Oni, 2025 [55]). Such an approach ensures that strategies are sensitive to individual experiences while addressing interpersonal, community, and structural barriers, ultimately enhancing the uptake of infectious disease and HIV diagnostic services and improving public health outcomes.

2.2 Key Components of the Stigma Reduction Framework

Addressing stigma is central to improving the uptake of infectious disease and HIV diagnostic services, as stigma represents a significant barrier that prevents individuals from seeking timely testing and care. Effective stigma reduction requires a multi-level framework that encompasses individual, interpersonal, community, structural, policy, and healthcare system interventions (Appoh *et al*., 2025; Adeshina and Poku, 2025 [7]). By integrating strategies across these levels, public health programs can create supportive environments that facilitate testing, reduce discrimination, and enhance overall health outcomes.

Individual-level interventions constitute the foundational component of the stigma reduction framework. Education and awareness campaigns are critical in correcting misconceptions about infectious diseases and HIV. Misinformation and myths often fuel fear and avoidance behaviors, discouraging people from seeking diagnostic services. Targeted educational initiatives provide accurate information on disease transmission, prevention, and treatment options, thereby increasing knowledge and reducing fear-based stigma. Counseling and peer support are equally important, particularly for high-risk populations, including people living with HIV or those with potential exposure. Peer-led interventions create safe spaces where individuals can share experiences, receive emotional support, and develop coping strategies, reinforcing the acceptability of testing and care-seeking behaviors. Empowerment strategies further strengthen individual resilience and confidence in accessing healthcare services. These strategies focus on enhancing self-efficacy, decision-making skills, and perceived agency, enabling individuals to overcome social and psychological barriers to testing (Okuwobi *et al*., 2025; Egemba *et al*., 2025) [49, 28].

Interpersonal and community-level interventions extend the influence of stigma reduction beyond the individual. Community engagement and participatory approaches ensure that interventions are culturally relevant, contextually adapted, and aligned with local norms. Involving community members in the design and implementation of programs fosters trust, ownership, and sustainability. Peer-led support groups and local champions serve as influential role models, normalizing testing behaviors and mitigating stigma within social networks. Such initiatives harness social influence to promote acceptance of diagnostic services and encourage individuals to seek testing without fear of judgment. Additionally, reducing discrimination and social exclusion in families and broader social networks is crucial (Bolarinwa *et al*., 2025; Fidel-Anyana *et al*., 2025) [26, 33]. Family acceptance and social support significantly impact individuals' willingness to access services, and interventions targeting these domains can reduce internalized and anticipated stigma, further enhancing uptake.

Structural and policy-level interventions address systemic barriers that perpetuate stigma. Ensuring that diagnostic services are confidential, accessible, and user-friendly is fundamental to fostering trust in healthcare systems. Physical accessibility, convenient service hours, and mobile or community-based testing options reduce logistical barriers and mitigate fears of exposure or social judgment. Anti-discrimination laws, workplace protections, and legal frameworks that explicitly protect individuals from HIV- or disease-related discrimination are essential for creating enabling environments. These policies reinforce the social acceptability of seeking care and signal institutional commitment to equity. Integrating stigma reduction into national health policies and programs ensures that interventions are scaled, standardized, and sustainably supported. By embedding these strategies into broader health planning, governments and health agencies can institutionalize stigma mitigation as a core component of public health practice (OBADIMU *et al*., 2025; Umezurike *et al*., 2025).

Healthcare system-level interventions are critical for operationalizing stigma reduction within service delivery. Training healthcare workers in culturally competent, nonjudgmental care promotes respectful interactions, increases patient trust, and enhances adherence to testing recommendations. Confidentiality protocols and robust privacy protections are fundamental to maintaining patient safety and encouraging participation in diagnostic services, particularly in settings where fear of disclosure is high. Reducing institutional stigma involves transforming organizational culture to prioritize inclusivity and patient-centered care. Inclusive service delivery, clear anti-discrimination policies, and ongoing monitoring of healthcare practices help mitigate systemic bias and reinforce a supportive environment for individuals seeking testing (Umezurike *et al*., 2025; Ozobu *et al*., 2025). By ensuring that healthcare facilities embody non-stigmatizing practices, these interventions enhance both the accessibility and acceptability of diagnostic services.

A comprehensive stigma reduction framework integrates interventions across multiple levels to address the complex and intersecting factors that inhibit the uptake of infectious disease and HIV diagnostic services. Individual-level education, counseling, and empowerment interventions directly target knowledge gaps and psychological barriers. Interpersonal and community strategies leverage social influence and participatory approaches to normalize testing behaviors and reduce discrimination. Structural and policy interventions create enabling environments through accessible services, legal protections, and integration into national health strategies. Healthcare system-level interventions operationalize stigma reduction within service delivery, promoting culturally competent, confidential, and inclusive care (Enow *et al*., 2025; Odinaka *et al*., 2025) [29, 42]. By combining these strategies, public health programs can effectively reduce stigma, improve community uptake of diagnostic services, and ultimately enhance early detection, treatment, and population health outcomes.

2.3 Strategies for Implementation

Implementing effective stigma reduction strategies for improving community uptake of infectious disease and HIV diagnostic services requires a multifaceted and context-sensitive approach. A key principle in designing these interventions is active engagement with the communities affected, ensuring that strategies are informed by local knowledge, cultural norms, and lived experiences as shown in Fig 1. Community-based participatory research (CBPR) offers a robust methodology for understanding the drivers, manifestations, and consequences of stigma at multiple levels (Appoh *et al*., 2025; Umezurike *et al*., 2025). Through CBPR, researchers collaborate directly with community members, healthcare providers, and local leaders to identify barriers to diagnostic uptake, explore perceptions of disease, and co-develop culturally appropriate messaging and intervention strategies. This participatory approach not only enhances the relevance and acceptability of interventions but also fosters community ownership, empowering individuals to become agents of change in addressing stigma. Additionally, CBPR can identify vulnerable subpopulations, such as marginalized groups or high-risk individuals, allowing for the tailoring of interventions to those most affected by stigma-related barriers.

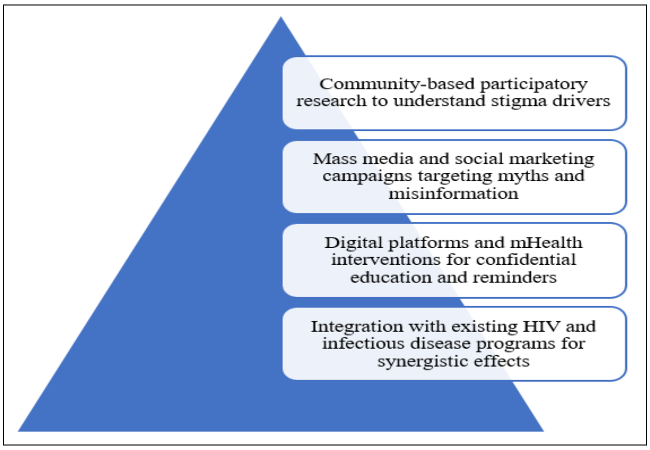

Fig 1: Strategies for Implementation

Mass media and social marketing campaigns play a complementary role by shaping public perceptions and challenging misinformation at scale. These campaigns leverage television, radio, print, and online platforms to disseminate evidence-based messages that normalize diagnostic testing, reduce fear, and address common myths about infectious diseases and HIV. Social marketing principles, including audience segmentation, behavior change messaging, and repeated exposure, enhance the effectiveness of these campaigns. Strategic partnerships with local media outlets, influential community figures, and advocacy groups can amplify reach and credibility, particularly in regions where cultural beliefs or misinformation perpetuate stigma (Eze *et al*., 2025; Asere *et al*., 2025) [32, 24]. Campaigns may also incorporate narratives of lived experiences, testimonials from people living with HIV, and demonstrations of confidential and supportive testing processes to increase relatability and trust.

Digital platforms and mobile health (mHealth) interventions provide additional avenues for confidential, personalized, and interactive engagement. Mobile applications, SMS reminders, chatbots, and online educational modules can deliver tailored health information while protecting privacy, a critical concern for individuals deterred by fear of exposure or discrimination. These digital interventions can include appointment scheduling, reminders for diagnostic testing, follow-up support, and interactive quizzes to reinforce knowledge and counter misconceptions. mHealth tools can be particularly effective in reaching younger populations, urban migrants, or individuals in remote areas who may have limited access to traditional health education resources. Integration of data analytics within these platforms allows for monitoring engagement, evaluating intervention effectiveness, and adapting content in real time based on user responses and emerging community needs (Ukamaka *et al*., 2025; Sanusi, 2025) [66, 60].

Integration of stigma reduction strategies with existing HIV and infectious disease programs enhances synergistic effects and maximizes resource efficiency. Embedding interventions within routine healthcare services, community outreach programs, or national testing campaigns ensures that stigma reduction becomes an integral component of broader public health initiatives rather than a stand-alone activity. For example, healthcare providers can be trained in stigma-sensitive communication, confidentiality protocols, and patient-centered counseling to reinforce the messages delivered through community and digital interventions. Partnerships between public health authorities, non-governmental organizations, and community-based organizations facilitate coordination, dissemination, and monitoring, allowing interventions to adapt dynamically to epidemiological trends, policy changes, or resource availability. Additionally, integration supports the sustainability of interventions by leveraging existing infrastructure, personnel, and funding mechanisms, thereby promoting long-term engagement and impact (Okereke *et al*., 2025; Omolayo *et al*., 2025 [54]).

In practice, these implementation strategies should be iterative and adaptive, informed by ongoing monitoring and evaluation. Feedback loops from community members, healthcare workers, and digital platform analytics provide critical insights into the effectiveness of messaging, the accessibility of services, and the persistence of stigma in various contexts. Interventions may need to be adjusted to address emerging misinformation, cultural sensitivities, or logistical barriers to testing. Continuous capacity building, training, and stakeholder engagement ensure that the strategies remain responsive to community needs and evolving public health challenges (Aransi, 2025; Umoren *et al*., 2025).

Implementing stigma reduction frameworks to improve diagnostic service uptake requires a combination of community-based participatory research, mass media and social marketing, digital and mHealth interventions, and integration with existing health programs. By leveraging these complementary strategies, interventions can address stigma at multiple levels—individual, interpersonal, community, and structural—while promoting trust, confidentiality, and accessibility. This multifaceted approach not only enhances engagement with infectious disease and HIV diagnostic services but also strengthens the overall effectiveness and equity of public health initiatives. Sustainable, evidence-based, and contextually tailored implementation is essential for overcoming stigma-related barriers and achieving improved health outcomes across diverse populations.

2.4 Monitoring and Evaluation

Monitoring and evaluation (M&E) are critical components of any stigma reduction framework aimed at improving community uptake of infectious disease and HIV diagnostic services. A well-structured M&E system not only measures the effectiveness of interventions but also provides insights for iterative refinement, ensuring that programs remain responsive to community needs and evolving public health contexts as shown in Fig 2 (Eyinade *et al*., 2025; Taiwo *et al*., 2025). Effective monitoring requires the identification of appropriate indicators that capture both changes in stigma and improvements in diagnostic service utilization.

Indicators for stigma reduction must assess attitudes, knowledge, and perceived discrimination across multiple levels-individual, interpersonal, community, and structural. Individual-level indicators can include self-reported attitudes toward people living with HIV or other infectious diseases, willingness to engage in testing, and internalized stigma. Interpersonal measures may capture experiences of discrimination, gossip, or social exclusion within family and peer networks. At the community level, indicators can reflect collective norms, public acceptance of testing, and engagement with awareness campaigns. Structural stigma can be assessed through policy compliance, availability of stigma-sensitive services, and institutional practices that promote confidentiality and nondiscrimination. Knowledge-based indicators assess understanding of disease transmission, the importance of testing, and awareness of rights and supportive services. The combination of these measures allows evaluators to capture nuanced changes in stigma that are often invisible in standard service utilization metrics.

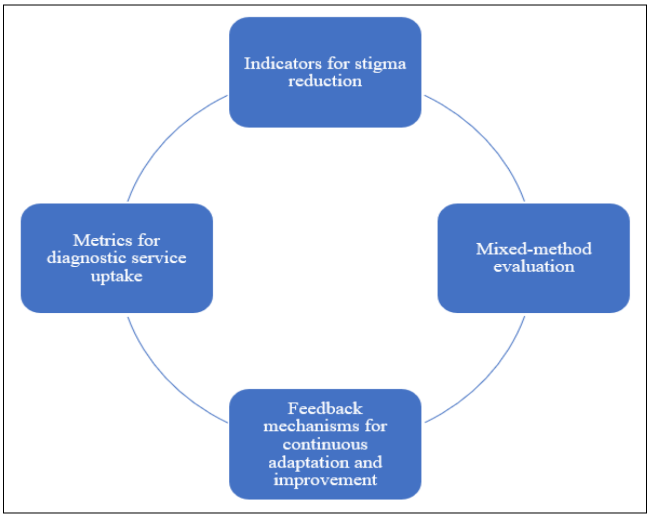

Fig 2: Monitoring and Evaluation

Metrics for diagnostic service uptake are equally important and should focus on both quantitative and qualitative dimensions. Quantitative metrics can include the proportion of individuals tested within a target population, frequency of repeat testing, proportion of positive cases successfully linked to care, and adherence to follow-up appointments. Service utilization patterns can also highlight disparities across demographic groups, geographic areas, or risk categories, allowing targeted interventions for vulnerable populations. Qualitative metrics provide contextual insights into why individuals choose or avoid testing, the barriers they face, and the influence of stigma on their health-seeking behavior. Together, these metrics provide a comprehensive understanding of program impact, revealing both successes and areas needing adjustment.

A mixed-method evaluation approach is ideal for capturing the multifaceted effects of stigma reduction interventions. Quantitative surveys can be conducted pre- and post-intervention to measure changes in knowledge, attitudes, and testing behaviors across representative populations. Standardized questionnaires, Likert scales, and validated stigma measurement tools ensure comparability and reliability. Qualitative methods, including in-depth interviews, focus group discussions, and participatory observation, allow for exploration of the underlying social dynamics, cultural beliefs, and personal experiences influencing stigma and testing behavior (Adeshina, 2025; Jimoh and Omiyefa, 2025 [36]). This combination of methods not only strengthens the validity of findings but also informs the design of more culturally sensitive and context-specific interventions.

Feedback mechanisms are integral to translating monitoring and evaluation results into actionable improvements. Real-time or periodic reporting of indicators can be shared with community stakeholders, program implementers, and policymakers to guide decision-making. Adaptive management approaches enable modifications to intervention content, delivery methods, or target populations based on emerging insights. Digital platforms and mHealth tools can facilitate continuous feedback loops, allowing users to provide anonymous input, report barriers to testing, or suggest improvements. Regular review meetings and participatory workshops with community representatives ensure that evaluation findings are understood and acted upon collaboratively, reinforcing trust and accountability.

In addition to guiding program adjustments, robust M&E systems contribute to evidence generation for broader public health policy. Data on stigma reduction and diagnostic uptake can inform national guidelines, funding allocation, and integration of stigma-sensitive practices into routine health services. Longitudinal monitoring also enables assessment of sustainability, showing whether changes in attitudes and behaviors are maintained over time.

Monitoring and evaluation of stigma reduction frameworks for infectious disease and HIV diagnostic services require a comprehensive set of indicators capturing attitudes, knowledge, perceived discrimination, and service utilization. Mixed-method approaches combining quantitative surveys and qualitative insights provide a nuanced understanding of program impact. Feedback mechanisms facilitate continuous adaptation, ensuring that interventions remain contextually relevant, effective, and sustainable. By systematically assessing both stigma and diagnostic uptake, M&E systems strengthen the evidence base for program refinement, policy development, and the scaling of interventions, ultimately enhancing health outcomes and equity in affected communities (Taiwo *et al.*, 2025; Olufemi *et al.*, 2025 [52]).

2.5 Challenges and Limitations

Implementing stigma reduction frameworks to improve community uptake of infectious disease and HIV diagnostic services presents multiple challenges and limitations. While comprehensive frameworks encompassing individual, community, structural, and healthcare system interventions offer significant promise, real-world application often encounters deeply entrenched social, cultural, and institutional barriers as in Fig 3 (Olisa, 2025 [50]; Adeshina, 2025). These challenges can limit the effectiveness, scalability, and sustainability of stigma reduction efforts, requiring careful consideration during program design, implementation, and evaluation.

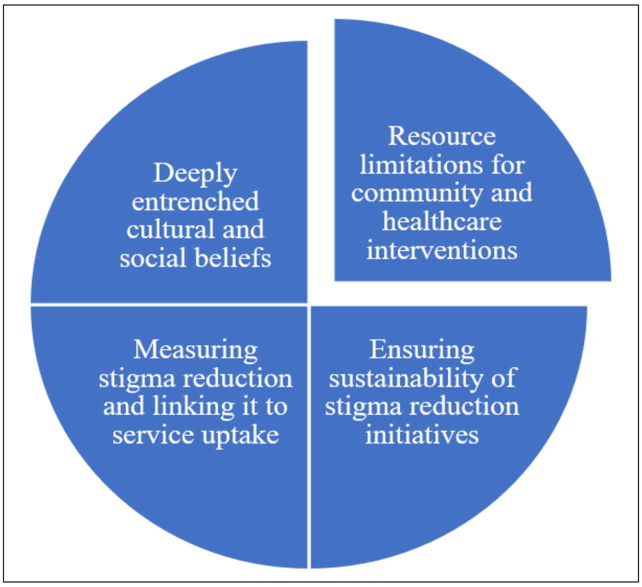

Fig 3: Challenges and Limitations

One of the primary challenges is the persistence of deeply entrenched cultural and social beliefs surrounding infectious diseases, particularly HIV. Stigma is frequently rooted in moral judgments, misconceptions about disease transmission, and fear of social ostracism. These beliefs are often reinforced by community norms, religious teachings, and intergenerational attitudes, creating a complex environment in which individuals may fear testing or disclosure. Even when educational campaigns and peer-led interventions are implemented, changing long-standing perceptions can be slow and incremental. Cultural sensitivity is therefore essential; interventions must be designed in partnership with local communities, leveraging trusted leaders and culturally appropriate messaging. However, the complexity and variability of social norms across regions and populations make it difficult to create universally effective strategies, limiting the generalizability of stigma reduction programs.

Resource limitations represent another significant constraint. Effective stigma reduction requires sustained investment in education campaigns, community engagement, peer support groups, healthcare worker training, and confidential diagnostic services. In low-resource settings, public health budgets may be insufficient to support these multi-level interventions. Shortages of trained personnel, logistical challenges in reaching remote populations, and limited infrastructure for confidential testing services can further hinder implementation. Additionally, competing public health priorities may divert attention and funding from stigma-focused initiatives, reducing their intensity and reach. Resource scarcity also affects the capacity for monitoring and evaluation, limiting the ability to measure impact and refine programs over time.

Measuring stigma reduction and linking it to improved uptake of diagnostic services is inherently challenging. Stigma is a complex, multi-dimensional construct encompassing internalized, perceived, and enacted components, making quantification difficult. Traditional outcome measures, such as the number of individuals tested or service utilization rates, may not fully capture changes in attitudes, beliefs, or social norms. Self-reported measures of stigma can be subject to social desirability bias, while community-level assessments require sophisticated sampling and survey techniques. Establishing a causal link between stigma reduction interventions and changes in service uptake further complicates evaluation, as multiple confounding factors—such as accessibility of services, health literacy, or concurrent public health campaigns—may influence testing behavior (Ozobu *et al*., 2025; Eyinade *et al*., 2025). These measurement challenges limit the ability to demonstrate program effectiveness and secure ongoing funding or policy support.

Ensuring the sustainability of stigma reduction initiatives is another key limitation. Many programs rely on external funding, short-term grants, or project-based interventions that may not be maintained once initial support ends. Without institutionalization within national health strategies, community structures, or healthcare systems, stigma reduction efforts risk fading over time. Additionally, staff turnover, shifts in political priorities, and changes in community leadership can disrupt program continuity. Sustainability requires embedding stigma reduction into routine health services, continuous training of healthcare workers, ongoing community engagement, and integration with broader public health policies. Building local capacity and fostering ownership among community members are critical to maintaining program momentum beyond the initial implementation phase.

While stigma reduction frameworks offer substantial potential for improving community uptake of infectious disease and HIV diagnostic services, several challenges limit their effectiveness. Deeply rooted cultural and social beliefs, resource constraints, difficulties in measuring stigma reduction, and concerns about long-term sustainability pose significant barriers to implementation. Addressing these limitations requires culturally sensitive and context-specific approaches, sustained investment in human and material resources, robust monitoring and evaluation frameworks, and strategies to institutionalize stigma reduction within health systems and community structures. By proactively recognizing and mitigating these challenges, public health programs can enhance the impact, reach, and longevity of stigma reduction initiatives, ultimately contributing to improved access to diagnostic services and better population health outcomes.

2.6 Policy and Public Health Implications

Policy and public health implications of stigma reduction frameworks for infectious disease and HIV diagnostic services are profound, as stigma remains a pervasive barrier to equitable access to care and optimal health outcomes. National HIV and infectious disease strategies increasingly recognize that biomedical interventions alone are insufficient to achieve epidemic control; social determinants, including stigma, must be addressed to enhance testing, linkage to care, and treatment adherence (Sala *et al*., 2025; James *et al*., 2025) [59, 35]. Integrating stigma reduction into national strategies ensures that health policies are comprehensive, person-centered, and capable of addressing the psychosocial and structural barriers that prevent individuals from seeking timely diagnostic services.

Strengthening national strategies requires explicit inclusion of stigma mitigation objectives alongside conventional prevention and treatment goals. This entails revising policy documents, program guidelines, and operational plans to incorporate evidence-based interventions that target stigma at multiple levels. For instance, national HIV programs can embed community sensitization campaigns, healthcare worker training on non-discriminatory practices, and confidential testing protocols directly into service delivery frameworks. By institutionalizing these measures, governments signal commitment to a human-rights approach, enhancing trust in the health system and promoting uptake of diagnostic services.

Targeted interventions for high-risk and marginalized populations are critical, as these groups often experience compounded stigma due to socioeconomic status, minority identity, or co-morbidities. Evidence shows that HIV-positive individuals, sex workers, men who have sex with men, and people who inject drugs face structural, community, and internalized stigma that significantly limits engagement with diagnostic services. Tailored interventions may include peer-led education, mobile and community-based testing, and culturally sensitive communication strategies. By directing resources and programmatic attention to these populations, health systems can reduce disparities in testing, early detection, and linkage to care, ultimately decreasing morbidity and mortality associated with infectious diseases.

Supporting equitable access to diagnostics and care extends beyond targeted interventions to encompass systemic measures. Health facilities must implement policies that guarantee confidentiality, non-discrimination, and respectful care. Investment in decentralized diagnostic infrastructure, such as mobile clinics or community health worker programs, reduces geographic and financial barriers that disproportionately affect rural or low-income populations. Equitable access also involves integrating stigma-sensitive approaches into broader public health programs, including maternal and child health, tuberculosis control, and sexually transmitted infection management, thereby mainstreaming stigma mitigation across services.

Multi-sectoral partnerships are indispensable for sustained stigma mitigation. Health ministries alone cannot address the complex social, cultural, and economic factors that perpetuate stigma. Collaborations with education, labor, justice, and social welfare sectors can facilitate comprehensive strategies that address structural drivers of stigma, such as discriminatory policies, workplace marginalization, and inequitable social norms (Adikwu *et al*., 2025; Osamika *et al*., 2025) [10, 56]. Public-private partnerships with non-governmental organizations, community-based organizations, and international agencies can mobilize technical expertise, funding, and grassroots networks to implement culturally sensitive interventions. Additionally, engagement with media and technology partners can amplify awareness campaigns, disseminate accurate information, and counter misinformation that fuels stigma.

Monitoring and evaluation mechanisms embedded in policy frameworks enhance accountability and continuous improvement. National strategies can establish benchmarks for stigma reduction, track diagnostic service uptake, and assess equity indicators. Data-driven insights allow policymakers to adjust interventions, reallocate resources, and reinforce accountability at all levels of implementation. Importantly, feedback loops involving affected communities ensure that policies remain responsive, contextually appropriate, and aligned with lived experiences.

Integrating stigma reduction into national HIV and infectious disease strategies has far-reaching public health implications. Targeted, equity-driven interventions for high-risk populations, combined with systemic measures to promote non-discrimination and access, enhance the effectiveness of diagnostic services. Multi-sectoral partnerships further strengthen program sustainability and reach. Collectively, these approaches create an enabling environment in which individuals are more likely to seek testing and care, ultimately improving population health outcomes, advancing health equity, and reinforcing the resilience of public health systems in the face of infectious disease challenges (Adebowale, 2025 [1]; Komi *et al*., 2025).

2.7 Future Directions

As public health strategies increasingly emphasize early detection and intervention, stigma reduction remains a critical component for improving community uptake of infectious disease and HIV diagnostic services. Future directions in this field focus on leveraging technology, broadening the scope of interventions, promoting cross-country collaboration, and establishing robust longitudinal evidence to optimize program effectiveness and sustainability.

One promising avenue is the integration of artificial intelligence (AI) and digital platforms to deliver anonymous counseling, education, and support services. Digital interventions, including mobile applications, chatbots, and web-based platforms, can provide personalized information, address misconceptions, and offer psychological support without exposing users to public scrutiny (Obadimu *et al*., 2025; Umoren *et al*., 2025). AI-driven chatbots, for instance, can simulate counseling interactions, respond to frequently asked questions, and adapt messaging based on user input, creating scalable and accessible interventions. These technologies can also incorporate machine learning algorithms to identify individuals at higher risk of avoiding testing due to stigma and deliver targeted, context-sensitive messaging. By providing confidential and on-demand resources, digital platforms reduce barriers associated with fear of judgment and social exposure, expanding reach to populations that may be otherwise difficult to engage.

Expanding stigma reduction frameworks to encompass other infectious diseases represents another critical future direction. While HIV has traditionally been the focus of stigma interventions, other conditions—such as tuberculosis, hepatitis, sexually transmitted infections, and emerging pathogens—also carry substantial social stigma that impedes diagnostic uptake. Integrating multi-disease approaches allows for synergistic interventions, reducing duplication of effort and promoting comprehensive health education. A broader focus also facilitates holistic engagement with communities, fostering a culture of health-seeking behavior that is not limited to a single disease. Such integration requires adaptive messaging, community consultation, and culturally sensitive design to address the specific stigma dynamics associated with each condition.

Cross-country collaboration offers additional opportunities to enhance the effectiveness and scalability of stigma reduction initiatives. Sharing best practices, programmatic lessons, and evaluation methodologies enables countries to adopt evidence-based interventions while adapting them to local contexts. Collaborative networks can support joint research initiatives, multi-site pilot programs, and capacity-building efforts for healthcare workers and community leaders. Global collaboration also facilitates the development of standardized metrics and evaluation tools, allowing for cross-national comparison and benchmarking of outcomes. These cooperative efforts promote the rapid dissemination of successful strategies, reduce redundancy in program development, and accelerate progress toward universal access to stigma-free diagnostic services.

Finally, establishing longitudinal studies to assess the long-term impact of stigma reduction interventions is essential for understanding their effectiveness over time. While short-term gains in knowledge and service uptake are important, sustained behavior change and reductions in internalized, perceived, and enacted stigma require ongoing monitoring. Longitudinal research can track shifts in community norms, individual attitudes, and healthcare utilization patterns over months or years, providing insights into which interventions are durable and which require reinforcement (Umezurike *et al*., 2025; Komi *et al*., 2025). Such studies can also assess downstream effects on health outcomes, including rates of early diagnosis, treatment adherence, and morbidity reduction, offering evidence for policymakers to prioritize investments in stigma reduction.

Future directions for stigma reduction frameworks emphasize innovation, integration, collaboration, and rigorous evaluation. Leveraging AI and digital platforms offers scalable and confidential avenues for education and counseling. Broadening the scope to include multiple infectious diseases fosters comprehensive engagement and reduces overall health-related stigma. Cross-country collaboration facilitates the sharing of best practices and scalable interventions, while longitudinal studies provide the evidence necessary to understand long-term effectiveness and guide policy. By pursuing these strategies, public health programs can strengthen community uptake of diagnostic services, enhance health equity, and improve population health outcomes across diverse settings (Komi *et al*., 2025; Umoren *et al*., 2025; OBADIMU *et al*., 2025; Umezurike *et al*., 2025).

3. Conclusion

Stigma remains a pervasive and critical barrier to the uptake of infectious disease and HIV diagnostic services, undermining efforts to achieve timely detection, treatment initiation, and overall disease control. Individuals affected by stigma often delay or avoid seeking testing due to fear of discrimination, social exclusion, or judgment, which not only exacerbates personal health risks but also contributes to continued transmission within communities. Addressing this complex social determinant requires comprehensive, multi-level approaches that recognize stigma's manifestations at individual, interpersonal, community, and structural levels.

Comprehensive frameworks designed to mitigate stigma emphasize coordinated strategies that integrate behavioral, social, and public health perspectives. Community-based interventions, including participatory research and peer-led education, facilitate local engagement and foster trust between healthcare providers and populations at risk. Mass media campaigns and digital health tools, such as confidential mobile health applications, expand the reach of stigma-reduction messaging while maintaining privacy and accessibility. Simultaneously, integrating stigma-sensitive approaches into existing HIV and infectious disease programs ensures that efforts are synergistic, reinforcing both biomedical and psychosocial components of care. These multi-faceted interventions collectively improve community engagement, increase diagnostic uptake, and enhance early linkage to care, thereby improving health outcomes at the population level.

Policy integration is essential for sustaining stigma reduction efforts. Embedding stigma-mitigation objectives into national HIV and infectious disease strategies formalizes the commitment of health systems to equitable, rights-based care. Multi-sectoral partnerships between health, education, social services, and civil society organizations further strengthen program reach, resources, and cultural relevance. Continuous monitoring and evaluation of interventions provide critical feedback, allowing policymakers and program implementers to identify gaps, adapt strategies to evolving community needs, and maintain accountability. By systematically addressing stigma through evidence-based, participatory, and policy-aligned approaches, health systems can reduce barriers to diagnostic services, promote inclusive care, and support broader public health goals.

Stigma reduction is integral to enhancing the accessibility and effectiveness of infectious disease and HIV diagnostic services. Multi-level, comprehensive frameworks that combine community participation, policy integration, and ongoing evaluation offer a sustainable pathway to improved engagement, equitable health outcomes, and resilient public health systems capable of responding effectively to ongoing and emerging infectious disease challenges.

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