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Review Article

# Health-System Determinants of Gender Disparities in HIV Infection Among Adolescent Girls and Young Women in Sokoto, North-Western Nigeria: Policy and Service Delivery Implications

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## Abstract

**Background:** Adolescent girls and young women remain disproportionately affected by HIV in sub-Saharan Africa. In north-western Nigeria, lower overall HIV prevalence does not eliminate concentrated vulnerability created by gender inequality, early marriage, limited education, economic dependence, low sexual autonomy, HIV-related stigma, and barriers to confidential health services. This review examines how biological and socio-cultural risks are intensified or mitigated by health-system design in Sokoto State.

**Methods:** An expanded narrative review was undertaken using the submitted conference abstract as the conceptual foundation. Targeted searches of PubMed and authoritative reports from UNAIDS, the World Health Organization, the National Agency for the Control of AIDS, UNFPA, and the World Bank were conducted for evidence available up to July 2026. The literature was organised using social-ecological and health-systems perspectives, with emphasis on service accessibility, acceptability, referral, confidentiality, workforce capacity, commodities, data, and the meaningful engagement of adolescent girls and young women.

**Results**: Gender disparities in HIV vulnerability arise from interacting biological, interpersonal, economic, socio-cultural, and health-system determinants. Biological susceptibility and sexually transmitted infections operate within relationships shaped by age-disparate partnerships, early marriage, limited condom negotiation, and economic dependence. Health-system barriers include fear of stigma and disclosure, judgemental provider attitudes, insufficient privacy, restrictive service hours, weak referral pathways, fragmented HIV and sexual and reproductive health services, inadequate commodities, and limited youth participation. Nigeria has developed relevant strategies, including the National HIV and AIDS Strategic Plan and the Generation Negative strategy. Programmes such as the Adolescent Girls Initiative for Learning and Empowerment can address educational and economic determinants, while Operation Triple Zero offers a youth-engagement model for adolescents living with HIV. However, coverage, institutionalisation, local coordination, and evaluation remain uneven. Evidence supports combination approaches that integrate youth-friendly services, HIV testing and self-testing, pre-exposure prophylaxis choice, condoms, sexually transmitted infection care, gender-based violence response, peer navigation, education, and social protection.

**Conclusion:** Reducing HIV disparities among adolescent girls and young women in Sokoto requires more than risk communication. It requires a gender-responsive health system that protects confidentiality, brings services closer to young people, connects clinics with schools and communities, strengthens referrals and commodity security, and gives adolescent girls and young women meaningful roles in programme design and accountability. Education and economic empowerment should be treated as core HIV prevention interventions rather than peripheral social activities.

**Keywords:** adolescent girls and young women; HIV prevention; gender disparity; health systems; youth-friendly services; Sokoto; Nigeria; PrEP; empowerment

## 1. Introduction

HIV remains a major public health and social justice challenge despite substantial progress in testing, treatment, and prevention. The burden is not evenly distributed. Adolescents and young adults face barriers associated with developmental stage, dependence on families, limited income, stigma, legal and policy constraints, and health services that are frequently designed around the needs of older adults (Barr-DiChiara *et al.,* 2021; Velloza *et al.,* 2020). Within this population, adolescent girls and young women experience a distinct intersection of biological susceptibility and gendered social disadvantage (Celum *et al.,* 2019; Iwelunmor *et al.,* 2020). UNAIDS estimated that 210,000 adolescent girls and young women aged 15-24 acquired HIV in 2023, equivalent to approximately 4,000 new infections every week, with more than three-quarters occurring in sub-Saharan Africa. Updated global estimates for 2024 continued to show approximately 4,000 infections per week among adolescent girls and young women, with the great majority occurring in the region. Nigeria's HIV epidemic is heterogeneous across states, age groups, sexes, and social networks. Although national prevalence is lower than that of several countries in eastern and southern Africa, Nigeria's large population means that the country continues to carry a substantial HIV burden. National evidence has demonstrated pronounced gender differences among young people. The 2021-2025 investment case for adolescents and young people reported that HIV prevalence among females aged 15-19 was approximately three times that of males in the same age group, while prevalence among women aged 20-24 was more than four times that of their male counterparts (Iwelunmor *et al.,* 2020). These findings demonstrate that a low average prevalence can coexist with substantial gender inequality.

Sokoto State presents a distinctive context. It is in north-western Nigeria and includes urban, peri-urban, rural, and hard-to-reach communities. Social and economic conditions relevant to adolescent health include poverty, low female educational attainment in some communities, early marriage, gendered decision-making, and barriers to independent mobility and health-seeking (Zeleke *et al.,* 2024). These conditions are not uniform across all families or communities and should not be interpreted through a deficit-based or culturally dismissive lens. Rather, they point to the need for programmes that work respectfully with adolescents, parents, spouses, religious leaders, traditional leaders, schools, community organisations, and health workers to protect health and rights. The term adolescent girls and young women usually refer to females aged 15-24 years, although adolescence itself is defined by the World Health Organization as the period between 10 and 19 years of age. These age bands include individuals with substantially different needs. A 15-year-old who depends on parents and remains enrolled in school differs from a married 23-year-old woman who may be pregnant, breastfeeding, or economically responsible for children. Health systems that treat adolescent girls and young women as a homogeneous category risk overlooking important differences in legal status, marital status, schooling, fertility intentions, sexual exposure, partner dynamics, and service preferences (Barr-DiChiara *et al.,* 2021; Celum *et al.,* 2019).

Gender disparities in HIV are commonly described through biological and socio-cultural determinants. Biological susceptibility may be shaped by the larger mucosal surface exposed during heterosexual intercourse, genital inflammation, mucosal injury, and untreated sexually transmitted infections. Socio-cultural determinants include gender norms, relationship power imbalances, age-disparate relationships, violence, early marriage, constrained condom negotiation, poverty, and educational exclusion (Celum *et al.,* 2019; Iwelunmor *et al.,* 2020). These factors are important, but they do not fully explain why some young women receive effective prevention services while others do not. The health system determines whether information becomes access, whether testing is confidential, whether a referral is completed, whether commodities are available, whether a provider is respectful, and whether a young person returns for follow-up. Evidence on HIV testing, PrEP,

community-based care, and self-testing demonstrates that service organisation, confidentiality, provider attitudes, and linkage mechanisms significantly affect utilisation among young people (Barr-DiChiara *et al.,* 2021; Ngcobo *et al.,* 2022). Health-system determinants therefore occupy a central position between vulnerability and health outcomes. A service can technically exist but remain inaccessible because it is distant, expensive, open only during school hours, or known to breach confidentiality. A health worker may offer HIV testing but discourage uptake through judgemental language. A facility may diagnose a sexually transmitted infection but fail to provide PrEP, contraception, or gender-based violence support. Similarly, a community programme may generate demand but lose clients through weak referral and follow-up systems (Ngcobo *et al.,* 2022; Zeleke *et al.,* 2024). These failures are not simply matters of individual behaviour; they represent deficiencies in service design, governance, coordination, and implementation (Celum *et al.,* 2019). Nigeria has adopted strategic frameworks relevant to adolescents and young people. The National HIV and AIDS Strategic Plan 2023-2027 provide overarching direction for prevention, testing, treatment, and health-system strengthening, while the Generation Negative strategy seeks to empower adolescents and young people as agents of change and broaden prevention beyond narrow risk messaging. Education-sector initiatives such as the Adolescent Girls Initiative for Learning and Empowerment address school access, life skills, and economic barriers that are structurally linked to HIV vulnerability (Celum *et al.,* 2019). Operation Triple Zero, although primarily designed for adolescents and young people living with HIV, demonstrates the potential value of peer support, self-management, and youth-responsive service delivery (Zeleke *et al.,* 2024).

## 2. Conceptual Framework

This review applies a social-ecological framework combined with a health-systems perspective. The social-ecological approach recognises that HIV vulnerability is produced at multiple levels, including individual, interpersonal, community, institutional, and policy levels. The health-systems perspective focuses on governance, financing, the health workforce, information systems, commodities, service delivery, and community participation. Gender is treated as a cross-cutting structure that shapes exposure, agency, service access, and the distribution of programme benefits. Within this framework, biological susceptibility does not operate in isolation. Its effects are mediated by relationship power, social norms, material resources, and service availability. Early marriage may increase the duration or frequency of sexual exposure, but the resulting risk depends on the partner's HIV status, condom use, access to testing, availability of PrEP, and the young woman's ability to seek care without violence, stigma, or other adverse consequences (Celum *et al.,* 2019). Poverty may contribute to school dropout, early marriage, economic dependence, or transactional relationships, but social protection, continued education, mentoring, and economic empowerment can alter these pathways (Iwelunmor *et al.,* 2020). Stigma may discourage testing or PrEP uptake, whereas confidential self-testing, peer support, and discreet service delivery can lower access barriers (Velloza *et al.,* 2020; Zeleke *et al.,* 2024). The framework therefore directs attention towards modifiable system conditions rather than attributing infection or limited-service uptake to individual failure.

## 3. Methods

### 3.1 Information Sources and Search Approach

Targeted searches were conducted for literature available up to July 2026. PubMed was searched for peer-reviewed studies and reviews on HIV vulnerability among adolescent girls and young women, youth-friendly sexual and reproductive health services, HIV self-testing, PrEP, stigma, peer interventions, economic empowerment, and integrated service delivery in sub-Saharan Africa. Authoritative policy and epidemiological documents were identified from UNAIDS, the World Health Organization, the National Agency for the Control of AIDS, UNFPA, and the World Bank. Nigeria-specific and Sokoto-relevant

sources were prioritised where available. Search terms were combined in different ways and included adolescent girls, young women, HIV, Nigeria, Sokoto, gender disparity, early marriage, youth-friendly services, stigma, health systems, PrEP, HIV self-testing, peer navigation, economic empowerment, education, AGILE, and Operation Triple Zero. Reference lists of key reports and reviews were examined to identify additional evidence. Recent sources were prioritised, while foundational or older sources were retained where they remained scientifically or policy relevant.

### 3.3 Eligibility and Thematic Synthesis

Sources were considered relevant if they addressed adolescent girls and young women or adolescents and young people, HIV prevention or care, gendered vulnerability, service access, health-system performance, or interventions applicable to sub-Saharan Africa or Nigeria. Studies focusing exclusively on populations or contexts with limited relevance to Sokoto were used cautiously to identify transferable principles rather than to generate direct local estimates. Evidence was organised into the following themes: Biological and individual determinants; Interpersonal and socio-cultural determinants; Economic and educational determinants; Health-system barriers; Programme responses; and Policy and service-delivery implications.

### 3.4 Limitations of the Evidence Base

Direct empirical literature on HIV vulnerability and youth-friendly service delivery among adolescent girls and young women in Sokoto is limited. Much of the detailed intervention evidence comes from eastern and southern Africa, where HIV incidence and health-system arrangements may differ considerably from those of north-western Nigeria (Celum *et al.,* 2019; Garcia *et al.,* 2022). Transferability therefore requires careful local adaptation. National programme documents may aggregate diverse state contexts and may not capture informal barriers such as family permission, transport costs, partner opposition, or provider behaviour. The review distinguishes documented evidence from policy inference and avoids assigning numerical weights to determinants where local data are unavailable.

## 4. Epidemiological and Policy Context

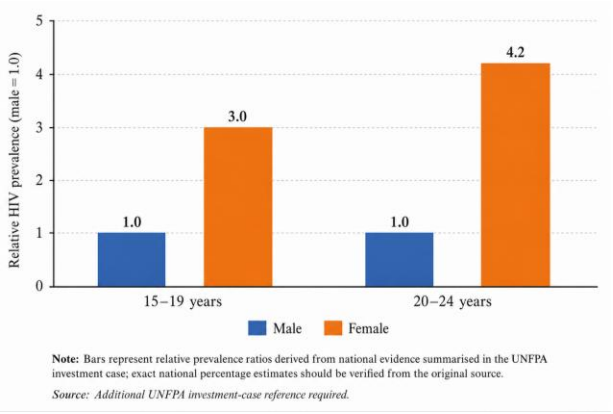
### 4.1 Global and Regional Context

The disproportionate burden of HIV among adolescent girls and young women is a defining feature of the epidemic in sub-Saharan Africa. The pattern has been associated with interacting biological, socio-economic, interpersonal, and structural factors, including poverty, gender inequality, violence, age-disparate relationships, limited control over sexual and reproductive decisions, and restricted access to prevention services (Iwelunmor *et al.,* 2020). Although new infections among adolescent girls and young women have declined since 2010, progress remains below global targets (Celum *et al.,* 2019). The persistence of thousands of new infections every week indicates that effective biomedical tools have not yet been delivered at sufficient scale or in forms that young women can consistently access and use (Nair *et al.,* 2023). Regional averages can conceal considerable diversity. HIV risk is higher in some settings, locations, and sexual networks than in others. Young women in age-disparate partnerships, those experiencing violence, young women who have left school, mobile populations, pregnant and breastfeeding women, young sex workers, and other marginalised subgroups may face elevated vulnerability.

### 4.2 Nigeria

Nigeria's national strategic documents recognise adolescents and young people as a priority population but also acknowledge that prevention investment has historically been limited relative to expenditure on testing and treatment. The Generation Negative strategy advocates a broader approach that empowers young people and addresses the social and institutional contexts in which HIV vulnerability is produced. National data indicate that female HIV prevalence rises substantially from mid-adolescence into young adulthood and exceeds male prevalence. Marriage is an important marker of sexual exposure among

young Nigerians, making marital status, antenatal care, family planning, and reproductive health services essential components of HIV prevention.




### 4.3 Sokoto State

Sokoto contributes a smaller share of Nigeria's HIV burden than several higher-prevalence states, but this should not lead to complacency. Prevention is likely to be most effective when it is strengthened before prevalence increases (Ojo, 2022). The state's large rural population, poverty, low female educational participation in some areas, early marriage, and limited availability of specialised adolescent services may create conditions in which infections remain undiagnosed, and prevention options are underused (Ngcobo *et al.,* 2022). Distance, transportation difficulties, insecurity along some routes, shortages of skilled health personnel, and weak digital connectivity may further affect service continuity. Sokoto also possesses important community and institutional assets. Religious and traditional institutions can support health promotion when they are meaningfully engaged. Primary health-care networks provide potential platforms for integrated HIV and reproductive health services. Schools, women's groups, youth organisations, community health workers, and peer networks can extend service reach. Community-based providers and peer structures can improve access when they receive adequate training, supervision, referral support, and integration with health facilities (Garcia *et al.,* 2022).

## 5. Determinants of Gender Disparities in HIV

### 5.1 Biological and Reproductive-Health Determinants

Biological differences contribute to heterosexual HIV acquisition risk. The female genital tract provides a larger mucosal surface that may be exposed during sexual intercourse, while genital inflammation, mucosal injury, and untreated sexually transmitted infections can increase susceptibility to HIV infection. These biological mechanisms do not make infection inevitable; their importance depends on viral exposure, partner characteristics, relationship dynamics, and access to effective prevention (Celum *et al.,* 2019). Adolescence and early reproductive life may coincide with cervical ectopy, hormonal changes, and limited experience in negotiating safer sex or seeking sexual and reproductive health care. Pregnancy and breastfeeding create additional contact with the health system but can also alter actual or perceived HIV risk. Integrating repeat HIV testing, partner services, PrEP assessment, and sexually transmitted infection management into antenatal, delivery, and postnatal care can transform these contacts into prevention opportunities (Nair *et al.,* 2023). Female-controlled prevention technologies are especially relevant in situations where condom negotiation is constrained. Oral PrEP and the dapivirine vaginal ring, where approved and available, can reduce dependence on partner cooperation (Celum *et al.,* 2019). Trials among African adolescent girls and young women have demonstrated substantial interest in prevention choice, although adherence and persistence can vary across products, individuals, and periods of risk (Nair *et al.,* 2023). Product availability alone is insufficient. Counselling must address side effects, disclosure, stigma, partner opposition, fertility intentions, convenience, and changing perceptions of risk. Programmes should also support informed switching between prevention methods rather than treating discontinuation of one product as programme failure (Velloza *et al.,* 2020).

### 5.2 Early Marriage, Age-Disparate Partnerships, and Limited Sexual Autonomy

Early marriage may increase the frequency and duration of sexual exposure while reducing an adolescent girl's ability to insist on condom use or request joint HIV testing. Married adolescents may also be missed by programmes that focus primarily on unmarried, school-going girls (Iwelunmor *et al.,* 2020). Service design should therefore include confidential and acceptable approaches for married adolescents and young women without framing marriage itself as a pathology. Age-disparate relationships can create inequalities in income, social authority, sexual decision-making, and previous exposure to HIV (Velloza *et al.,* 2020). Older male partners may have had more previous sexual partnerships and may have a higher probability of HIV exposure than adolescent boys. Economic dependence and unequal relationship power may make refusal of sex or negotiation of condom use more difficult (Celum *et al.,* 2019). Couples testing and male engagement can be helpful, but safeguards are required to ensure that these services do not expose adolescent girls and young women to coercion, involuntary disclosure, abandonment, or violence. Consent policies and practices must also recognise the rights, evolving capacities, and protection needs of adolescents (Barr-DiChiara *et al.,* 2021). Sexual autonomy is shaped by more than individual knowledge. A young woman may understand HIV prevention but lack permission to travel, money for transport, confidence that confidentiality will be protected, or power to use a product discreetly. Programmes that measure knowledge without assessing effective access and agency may therefore overestimate a young woman's ability to act on health information (Velloza *et al.,* 2020).

### 5.3 Poverty, Education, and Economic Dependence

Poverty influences HIV vulnerability through multiple pathways. It can contribute to school interruption, early marriage, dependence on partners, inability to pay for transportation, and difficulty prioritising preventive care. Food insecurity and urgent household needs may also increase reliance on transactional relationships. At the facility level, nominally free services may still impose indirect costs through transportation, waiting time, laboratory fees, missed school or work, and repeated visits (Iwelunmor *et al.,* 2020). Education can be protective through delayed marriage, improved health literacy, stronger social networks, and expanded future economic opportunities. School attendance also creates a platform for life-skills education, safeguarding, and referral to health services. The Adolescent Girls Initiative for Learning and Empowerment is therefore potentially relevant to HIV prevention, even though it is not primarily an HIV programme (Barr-DiChiara *et al.,* 2021). By improving girls' access to secondary education, scholarships, safe schools, and life skills, the programme may reduce structural vulnerabilities. To maximise health impact, education programmes should establish clear referral links to confidential adolescent health services. These services should also include out-of-school, married, pregnant, and parenting adolescents who may not be reached through school-based interventions. Economic empowerment interventions show promise but are not automatically effective. Cash transfers, savings groups, vocational skills, and livelihood support may improve agency, but programme designs must account for safety, household dynamics, implementation fidelity, sustainability, and local labour markets (Iwelunmor *et al.,* 2020). Evidence suggests that economic interventions may be most effective when combined with gender-transformative education, mentoring, social support, and accessible biomedical prevention rather than delivered as isolated income-generating projects (Iwelunmor *et al.,* 2020).

### 5.4 Gender Norms, Stigma, and Violence

Gender norms influence expectations regarding obedience, sexuality, mobility, and disclosure. Girls may be expected to remain uninformed about sexual health, while seeking condoms, HIV testing, or PrEP may be interpreted as evidence of sexual activity. These norms can discourage prevention even when services are physically available. Community dialogue should therefore address the social meaning attached to service use rather than merely advertising clinic locations. HIV-related stigma operates at multiple levels.

Anticipated stigma may deter testing or PrEP uptake; experienced stigma may follow disclosure; and internalised stigma can affect self-worth, prevention adherence, and continued engagement in care (Velloza *et al.,* 2020). Stigma may also attach to PrEP because other people may assume that the medication is antiretroviral treatment or evidence of promiscuity (Velloza *et al.,* 2020). Private service spaces, discreet packaging, trained providers, supportive counselling, and peer support can reduce these barriers. However, confidentiality must be embedded in facility procedures and not left solely to the discretion of individual health workers (Barr-DiChiara *et al.,* 2021) Gender-based violence increases HIV vulnerability directly through forced sex and genital traum. HIV services should therefore include safe enquiry, first-line support, and functional referral pathways to medical, psychosocial, legal, and protection services. Screening for violence without an effective and safe response pathway may be unethical and can expose young women to further harm (Barr-DiChiara *et al.,* 2021).

## 6. Health-System Determinants

### 6.1 Availability and Geographic Access

Many health facilities provide some HIV services, but adolescent-friendly care is often concentrated in urban or higher-volume facilities. Rural adolescent girls and young women may face long travel distances, transport costs, limited service hours, and dependence on adults or partners for mobility. Outreach, community-based testing, mobile services, task sharing, and integration into primary health care can improve access (Ngcobo *et al.,* 2022; Zeleke *et al.,* 2024). However, outreach must maintain privacy and avoid publicly identifying individuals as being sexually active or at risk of HIV. Community-based approaches require confidential procedures, trained personnel, secure documentation, and reliable referral links to health facilities (Ngcobo *et al.,* 2022).

### 6.2 Acceptability, Confidentiality, and Provider Behaviour

Youth-friendly care requires more than the establishment of a signboard or designated youth corner. Provider attitudes, privacy, confidentiality, waiting time, consent requirements, opening hours, and perceived judgement can strongly influence whether young people use available services (Zeleke *et al.,* 2024). Adolescents need clear explanations of confidentiality and its legal or safeguarding limits. Consultation rooms should prevent conversations from being overheard, records should be securely protected, and providers should avoid requiring unnecessary parental or spousal permission. National policies concerning adolescents' independent access to HIV testing vary widely across sub-Saharan Africa, and restrictive or unclear consent requirements can create major barriers (Barr-DiChiara *et al.,* 2021). Provider training should be reinforced through mentorship, supportive supervision, client feedback, and accountability. A single disrespectful or confidentiality-breaching encounter can undermine trust not only for one adolescent but also across her peer network (Barr-DiChiara *et al.,* 2021).

### 6.3 Fragmentation of HIV and Sexual and Reproductive Health Services

Adolescent girls and young women may require HIV testing, contraception, pregnancy testing, sexually transmitted infection diagnosis, PrEP, post-violence care, and mental-health support at the same time (Ngcobo *et al.,* 2022). Fragmented services require multiple queues, providers, referrals, and visits, increasing financial cost, waiting time, stigma, and loss to follow-up. Integrated service delivery can improve convenience and reduce stigma by making HIV prevention part of routine reproductive and primary health care. Integration should include clear clinical algorithms, task sharing, provider competencies, commodity planning, and referral tracking rather than merely locating services in the same building (Celum *et al.,* 2019).

### 6.4 Weak Referral and Continuity Systems

A referral is successful only when a client reaches the designated service and receives the required intervention. Peer navigators, community health

workers, and appropriate digital follow-up can improve continuity, provided confidentiality and safeguarding are protected (Garcia *et al.,* 2022). Referral directories should be regularly updated, and facilities should establish closed-loop communication so that the originating provider knows whether the client received the recommended care (Ngcobo *et al.,* 2022). Newly diagnosed or otherwise high-priority clients require rapid linkage to treatment and support. Young women initiating PrEP require early follow-up, adherence support, flexible refill options, and opportunities to discontinue or restart PrEP as their circumstances and periods of risk change (Nair *et al.,* 2023).

### 6.5 Workforce Capacity and Workload

Shortages of trained health workers can contribute to long waiting times, rushed consultations, weak counselling, and limited provision of preventive services. Providers may prioritise acute clinical tasks over preventive conversations, particularly in understaffed facilities (Ngcobo *et al.,* 2022). Task sharing with nurses, medical laboratory personnel, community health workers, and trained peer educators can expand service capacity. However, each cadre requires a clearly defined scope of practice, appropriate training, supportive supervision, job aids, and access to functional referral systems (Garcia *et al.,* 2022). Youth-friendly services should be incorporated into routine performance review and quality-improvement systems rather than depending on a single enthusiastic focal person. Overdependence on one trained worker can cause the service to collapse when that person is transferred, unavailable, or overburdened (Ngcobo *et al.,* 2022).

### 6.6 Commodities, Diagnostics, and Prevention Choice

Stock-outs of HIV test kits, condoms, sexually transmitted infection medicines, pregnancy tests, or PrEP can rapidly damage community confidence and discourage future service use. Commodity security requires accurate forecasting, timely reporting, redistribution mechanisms, buffer stocks, and clear accountability (Celum *et al.,* 2019). Prevention choice should be expanded as national guidelines, regulatory approvals, and resources permit. HIV self-testing may appeal to young people because it offers privacy, autonomy, and convenience, but distribution must be linked to confirmatory testing, counselling, prevention services, and treatment (Zeleke *et al.,* 2024). PrEP delivery should recognise changing periods of risk and support informed choice rather than coercive risk labelling. Evidence from African adolescent girls and young women demonstrates the importance of offering product choice and adapting support to the user's preferences and circumstances (Nair *et al.,* 2023).

### 6.7 Information Systems and Data Use

Age- and sex-disaggregated data are essential for identifying gender and service-delivery gaps. However, routine systems may aggregate adolescents with older adults or fail to record outcomes across multiple referral points. Data systems should capture HIV testing, positivity, linkage, PrEP initiation and continuation, sexually transmitted infection services, and violence referrals by age, sex, marital status, and location while maintaining privacy (Celum *et al.,* 2019). Qualitative feedback from adolescent girls and young women is also necessary because numerical service uptake does not reveal disrespectful treatment, fear of disclosure, hidden financial costs, partner opposition, or the reasons for PrEP discontinuation (Velloza *et al.,* 2020).

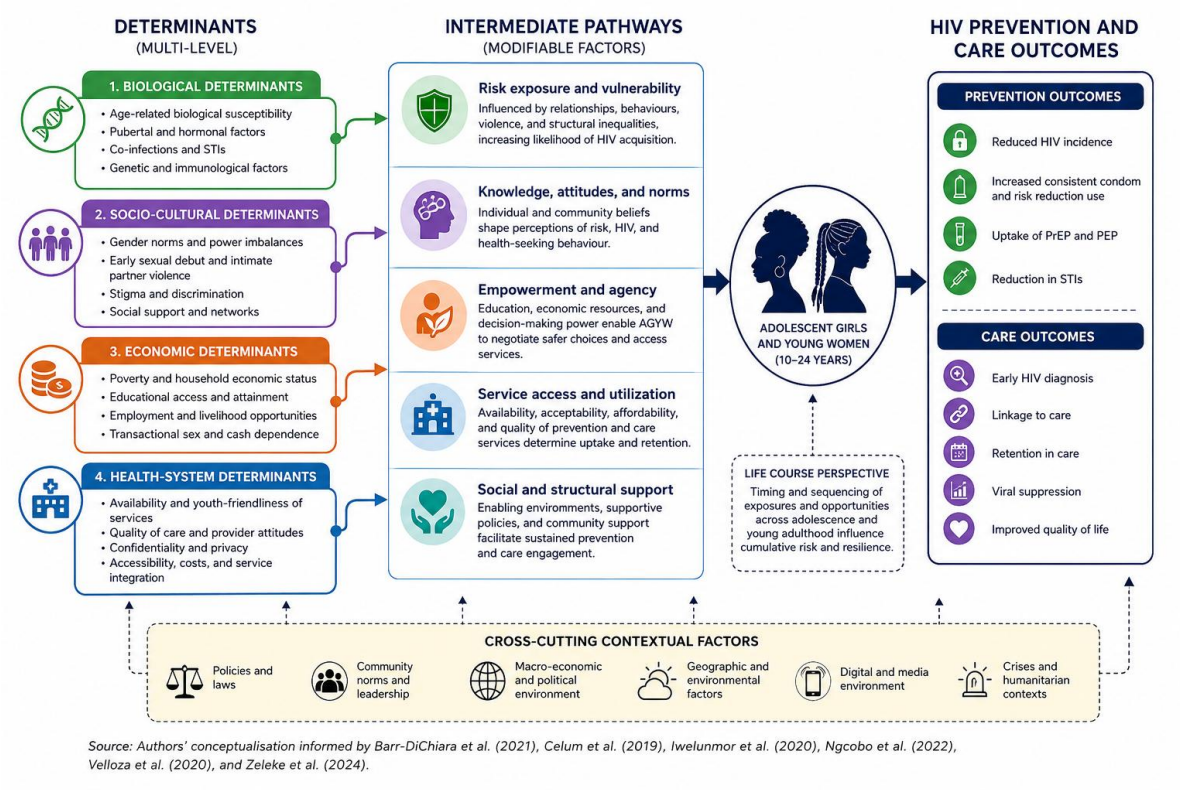
### 6.8 Governance, Financing, and Youth Participation

Underinvestment in primary HIV prevention is a national concern (Garcia *et al.,* 2022. State and local plans should include defined budgets for youth-friendly services, community engagement, commodities, outreach, referral systems, peer navigation, and quality improvement. Coordination among the health, education, women's affairs, youth, social protection, and community sectors is essential. Peer-led models can strengthen trust and demand creation when peers are properly selected, trained, supervised, protected, and remunerated (Garcia *et al.,* 2022).

**Table 1; Health-System Barriers and Corresponding Service-Delivery Responses**

| System domain | Common barrier | Priority response |
|---|---|---|
| Geographic access | Long distance, transport costs, and dependence on others for mobility | Integrate services at primary health-care level; use outreach, mobile services, and community delivery |
| Service hours | Clinics operating during school or working hours | Introduce flexible hours, scheduled appointments, and fast-track services |
| Acceptability | Judgemental language and fear of being labelled sexually active | Provide adolescent-centred communication training, mentorship, and client-feedback systems |
| Privacy and confidentiality | Consultations being overheard or information disclosed | Establish private consultation spaces, secure records, and clear confidentiality procedures |
| Consent | Unclear or unnecessary parental or spousal permission | Provide practical guidance consistent with national law and adolescent safeguarding principles |
| Service integration | Separate HIV, reproductive health, STI, and violence-response services | Provide coordinated or one-stop services using clear clinical algorithms |
| Referral | Paper referrals without follow-up | Introduce peer navigation, referral tracking, feedback, and transportation support where required |
| Workforce | Inadequate staffing and high provider workload | Use task sharing, mentorship, job aids, and routine quality improvement |
| Commodities | Stock-outs of test kits, condoms, STI medicines, and PrEP | Strengthen forecasting, reporting, redistribution, buffer stocks, and accountability |
| Prevention choice | Limited availability of confidential or female-controlled options | Expand HIV self-testing, oral PrEP, and other approved prevention choices |
| Information systems | Poor age and sex disaggregation | Develop AGYW-sensitive indicators while protecting individual privacy |
| Governance | Fragmented sectors and donor-dependent activities | Establish state-led multisectoral coordination, recurrent financing, and youth representation |

Note. AGYW = adolescent girls and young women; PHC = primary health care; SRH = sexual and reproductive health; STI = sexually transmitted infection; GBV = gender-based violence; PrEP = pre-exposure prophylaxis; HIVST = HIV self-testing. The table was developed from evidence presented by Barr-DiChiara *et al.* (2021)




*Source: Authors' conceptualisation informed by Barr-DiChiara et al. (2021), Celum et al. (2019), Iwelunmor et al. (2020), Ngcobo et al. (2022), Velloza et al. (2020), and Zeleke et al. (2024).*

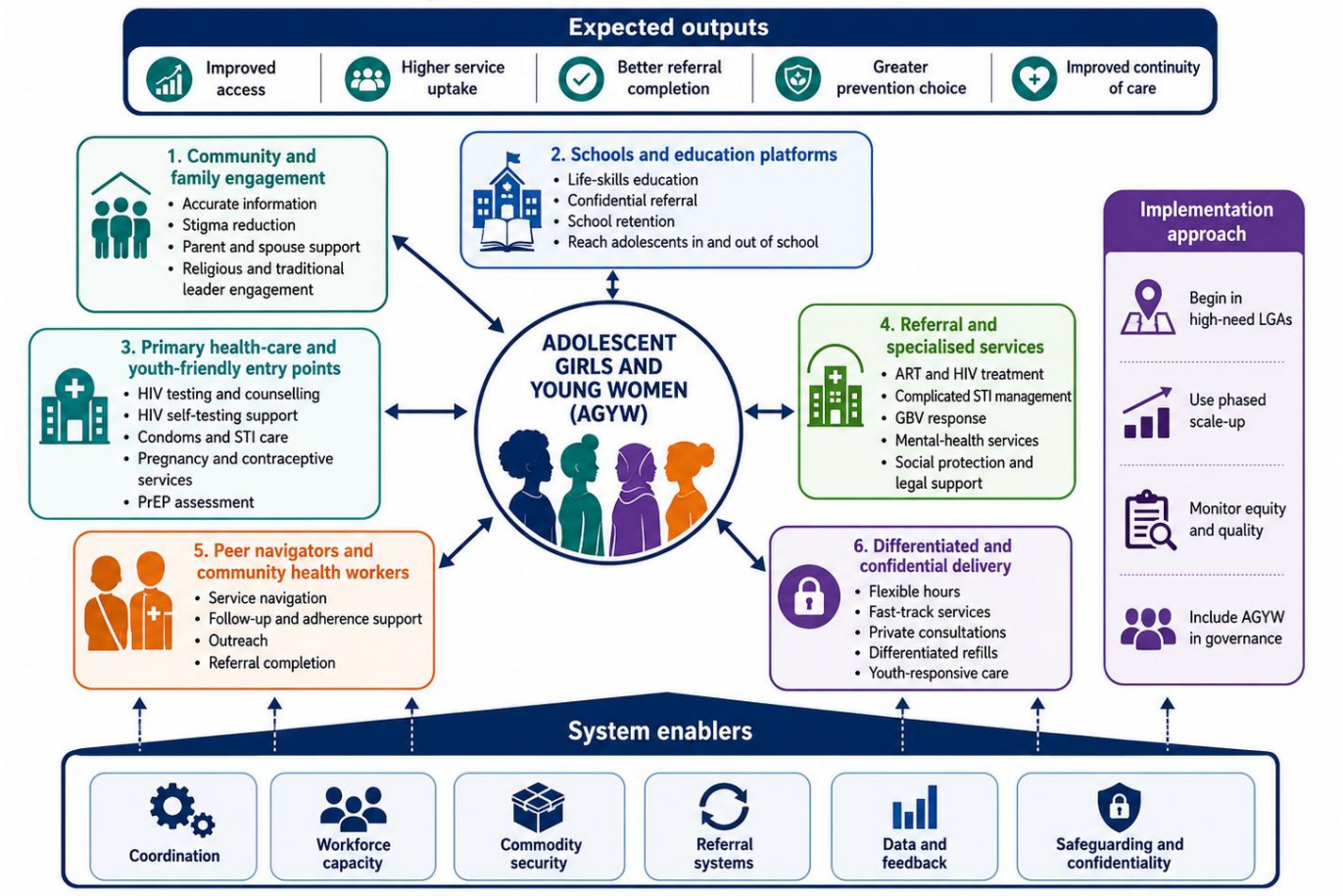



**Figure 3. Proposed integrated and AGYW-centred service-delivery model for Sokoto State.** Source: Authors' conceptualisation informed by Celum *et al.* (2019).

## 7. Existing and Emerging Programme Responses

### 7.1 Operation Triple Zero

Operation Triple Zero promotes zero missed appointments, zero missed medication doses, and zero unsuppressed viral load among adolescents and young people living with HIV (Ngcobo *et al.,* 2022). Its primary purpose is to improve treatment adherence and viral suppression rather than prevent HIV acquisition among HIV-negative adolescent girls and young women. Nevertheless, its youth-driven structure, peer support, and emphasis on self-management may provide useful lessons for prevention programming. A Sokoto platform for adolescent girls and young women could adapt these principles to promote regular testing when indicated, sustained PrEP use during periods of vulnerability, completion of referrals, and active participation in service-quality monitoring. The distinction between programme adaptation and direct evidence of prevention effectiveness should be maintained.

### 7.2 AGILE and the Education Platform

The Adolescent Girls Initiative for Learning and Empowerment seeks to increase access to secondary education and address demand- and supply-side barriers in northern Nigeria, including Sokoto (Ngcobo *et al.,* 2022). Education, scholarships, life skills, and safer schools may influence HIV vulnerability through delayed marriage, improved agency, stronger health literacy, and expanded livelihood opportunities. Health-sector collaboration can strengthen referral from schools to confidential services.

However, school-based activities must protect privacy and must not exclude out-of-school, married, pregnant, parenting, or otherwise marginalised adolescents.

### 7.3 Peer-Led and Community-Based Interventions

Peer educators and ambassadors can improve trust, prevention literacy, demand creation, and service navigation. Evidence from a PrEP ambassador field test in Zimbabwe showed that trained adolescent girls and young women could promote PrEP awareness and engagement within their communities (Garcia *et al.,* 2022). Peer programmes require careful selection, adequate remuneration, supervision, confidentiality training, safeguarding, and functional referral tools. Unpaid volunteer models may be difficult to sustain and may reproduce existing economic inequities. Community health workers can extend HIV education, testing, follow-up, and linkage, particularly in underserved communities. However, they require updated training, supportive supervision, adequate supplies, recognition within the health system, and strong connections with facilities (Ngcobo *et al.,* 2022).

### 7.4 HIV Self-Testing and Differentiated Testing

HIV self-testing is acceptable to many young people and can reach individuals who avoid facility-based testing because of stigma, inconvenience, or confidentiality concerns (Zeleke *et al.,* 2024). Distribution options may include pharmacies, community agents, health facilities, antenatal services, and appropriately designed educational platforms. Safeguards should include clear instructions, access to assistance, confirmatory testing, violence-sensitive counselling, and confidential linkage to prevention or treatment. Testing strategies should be guided by epidemiology, informed consent, individual preference, and potential benefit rather than indiscriminate mass testing or stigmatising risk profiling (Barr-DiChiara *et al.,* 2021; Zeleke *et al.,* 2024).

### 7.5 PrEP and Prevention Choice

Oral PrEP is effective when taken as prescribed, but persistence among adolescent girls and young women may be affected by side effects, changing risk perception, partner opposition, HIV-related stigma, disclosure concerns, and frequent clinic visits (Celum *et al.,* 2019; Velloza *et al.,* 2020). Evidence from trials of oral PrEP and the dapivirine vaginal ring demonstrates the importance of prevention choice and user-centred delivery (Nair *et al.,* 2023). In Sokoto, implementation should include provider readiness, reliable commodity systems, simple eligibility assessment, pregnancy and breastfeeding guidance, and community education that clearly distinguishes PrEP from antiretroviral treatment. Peer support, differentiated refill arrangements, discreet packaging, and flexible service-delivery models may improve continuation and acceptability (Celum *et al.,* 2019) (Velloza *et al.,* 2020).

### 7.6 Combination Prevention and Social Protection

The available evidence supports combination approaches that address biomedical, behavioural, interpersonal, and structural determinants together. Economic empowerment interventions show potential, although effectiveness depends on implementation quality, reach, context, and integration with other services (Iwelunmor *et al.,* 2020). DREAMS evaluations have reported improvements in testing, HIV status awareness, and some sexual-health outcomes, with evidence of reduced incidence in particular settings. For Sokoto, a practical combination package would connect HIV and reproductive health services with school retention, livelihood support, violence response, mental-health services, peer networks, and community norm change (Garcia *et al.,* 2022).

## 8. Proposed Integrated Service-Delivery Model for Sokoto

A Sokoto service-delivery model should be built around multiple entry points connected by a common referral, safeguarding, and quality-improvement system. Community and family engagement should create supportive norms and improve access to accurate information. Schools

and education programmes should provide age-appropriate life skills and confidential referral options (Garcia *et al.,* 2022). Primary health-care facilities and youth-friendly entry points should provide HIV testing, support for self-testing, condoms, sexually transmitted infection services, pregnancy-related care, and PrEP assessment. Higher-level facilities and specialised partners should receive referrals for antiretroviral therapy, complicated sexually transmitted infections, gender-based violence, mental-health conditions, and social protection. Peer navigators and community health workers can help adolescent girls and young women move between these services, if they receive adequate training, supervision, safeguarding, and referral support (Ngcobo *et al.,* 2022).

The model requires a coordination platform involving the Sokoto State Ministry of Health, the State Agency for the Control of AIDS, education authorities, ministries responsible for women and youth, local government authorities, implementing partners, community leaders, and representatives of adolescent girls and young women. Core functions should include joint microplanning, commodity monitoring, maintenance of updated referral directories, data review, safeguarding, provider mentorship, and community feedback. A phased approach could begin in high-volume or high-need local government areas and expand following implementation evaluation.

**9. Policy and Service-Delivery Implications**

First, adolescent-friendly care should be institutionalised as a quality standard across relevant primary and secondary health facilities. This requires private consultation spaces, trained personnel, flexible service hours, confidential records, clear consent procedures, and routine quality monitoring (Velloza *et al.,* 2020). A standalone youth corner may be useful in some facilities but should not become the only place where young people receive respectful care. Second, HIV prevention should be integrated with sexual and reproductive health services. Adolescent girls and young women should be able to receive HIV testing, condoms, contraception, sexually transmitted infection care, pregnancy services, PrEP counselling, and violence-sensitive support through coordinated pathways. Integration can reduce repeated visits and minimise the stigma associated with attending a visibly HIV-labelled service (Barr-DiChiara *et al.,* 2021). Third, the state should treat girls' education and economic empowerment as HIV prevention investments. Health authorities should collaborate with AGILE and other education and social-protection initiatives to establish referral, safeguarding, and outcome indicators. Economic programmes should be linked with mentoring, gender-responsive education, and access to biomedical prevention (Iwelunmor *et al.,* 2020). Programmes must also include out-of-school and married young women rather than focusing only on students. Fourth, service delivery should offer prevention choice. HIV self-testing, provider-administered testing, oral PrEP, and future long-acting options should be introduced in accordance with national policy, regulatory approval, local capacity, and informed preference. Choice increases the likelihood that a young woman can identify an option compatible with her relationships, privacy needs, reproductive intentions, and daily activities (Nair *et al.,* 2023; Zeleke *et al.,* 2024). Fifth, community engagement should move beyond one-way sensitisation. Parents, husbands, religious leaders, and traditional leaders can contribute to stigma reduction and timely care, but the autonomy, safety, and confidentiality of adolescent girls and young women must remain central. Dialogue should frame HIV services as components of general health, responsible prevention, family well-being, and human dignity (Barr-DiChiara *et al.,* 2021). Sixth, local data should drive action. Facilities and programmes should review age- and sex-disaggregated indicators, referral completion, PrEP continuation, and experience-of-care measures. Data should be interpreted carefully in low-prevalence settings, where small numbers may fluctuate considerably. Qualitative information should be used to identify hidden barriers before they become visible in coverage indicators. Seventh, financing should correspond with stated policy priorities. Youth-friendly services, outreach, peer navigators, commodities,

supervision, and quality improvement require recurrent budgets. Dependence on short-term donor projects can produce repeated cycles of expansion and collapse. State ownership and integration into routine operational plans are therefore necessary for sustainability.

## 10. Discussion

The central argument of this review is that gender disparity in HIV infection among adolescent girls and young women cannot be reduced through individual behaviour change alone. Biological susceptibility and relationship-level risks are important, but the health system determines whether young women can convert knowledge into effective protection. Services that are distant, judgemental, fragmented, or unreliable can reproduce vulnerability, whereas respectful and integrated care can strengthen agency even when broader social inequalities persist (Barr-DiChiara *et al.,* 2021; Celum *et al.,* 2019).

## 11. Recommendations

### 11.1 Recommendations for the Sokoto State Government and Public Health Institutions

Adopt and operationalise state-level standards for confidential, respectful, and integrated adolescent- and youth-friendly HIV and sexual and reproductive health services. Map the availability of services for adolescent girls and young women and establish referral networks linking primary health-care facilities, hospitals, schools, community platforms, gender-based violence services, and social-protection programmes. Create a multisectoral coordination mechanism for HIV prevention among adolescent girls and young women, with meaningful youth representation and a dedicated implementation budget. Strengthen forecasting, reporting, redistribution, and buffer-stock arrangements for HIV test kits, condoms, sexually transmitted infection commodities, pregnancy tests, and PrEP. Include age-, sex-, marital-status-, and location-disaggregated prevention indicators and experience-of-care measures in routine performance reviews. Partner with religious and traditional institutions using culturally respectful messages that promote prevention, confidentiality, informed decision-making, and timely care.

### 11.2 Recommendations for Health Facilities and Providers

Protect privacy, clearly explain confidentiality, and minimise unnecessary parental, partner, or spousal permission requirements, consistent with applicable laws and safeguarding standards (Barr-DiChiara *et al.,* 2021). Offer integrated HIV testing, sexually transmitted infection care, reproductive health services, violence-sensitive support, and PrEP assessment at convenient service entry points. Use flexible hours, fast-track visits, community delivery, and differentiated refill models for students, married adolescents, and working young women. Establish closed-loop referral systems and use trained peer navigators or community health workers for high-priority clients (Garcia *et al.,* 2022; Ngcobo *et al.,* 2022). Conduct routine provider mentorship, confidential client-feedback exercises, and quality-improvement cycles focused on adolescent experience and confidentiality.

### 11.3 Recommendations for Implementing Partners and Civil Society

Co-design programmes with diverse groups of adolescent girls and young women, including rural, married, out-of-school, pregnant, breastfeeding, and disabled young women. Avoid duplicative vertical projects and align investments with state systems, national strategies, and sustainability plans. Support peer-led demand creation, HIV self-testing linkage, PrEP literacy, and economic empowerment with adequate safeguarding, supervision, and remuneration (Garcia *et al.,* 2022). Generate implementation evidence on programme reach, equity, referral completion, service quality, cost, and sustainability in north-western Nigeria.

### 11.4 Research Priorities

Conduct mixed-methods studies on HIV knowledge, testing preferences, service barriers, and prevention needs among adolescent girls and young women in Sokoto. Disaggregate findings by age, marital status, educational status, rurality, pregnancy status, disability, and other relevant characteristics. Evaluate integrated youth-friendly service models using implementation outcomes such as acceptability, feasibility, fidelity, reach, equity, sustainability, and cost. Assess how educational and economic empowerment programmes influence HIV-related agency, relationship power, and service uptake. Document the effectiveness and transferability of peer-support models.

### References

Barr-DiChiara, M., Tembo, M., Harrison, L., Quinn, C., Ameyan, W., Sabin, K., Jani, B., Jamil, M. S., Baggaley, R., & Johnson, C. (2021). Adolescents and age of consent to HIV testing: An updated review of national policies in sub-Saharan Africa. *BMJ Open, 11*(9), Article e049673.

Celum, C. L., Delany-Moretlwe, S., Baeten, J. M., van der Straten, A., Hosek, S., Bukusi, E. A., McConnell, M., Barnabas, R. V., & Bekker, L.-G. (2019). HIV pre-exposure prophylaxis for adolescent girls and young women in Africa: From efficacy trials to delivery. *Journal of the International AIDS Society, 22*(S4), Article e25298.

Garcia, M., Nhamo, D., Macagna, N., Mamvuto, T., Katsande, N., Morales, G., Lanham, M., Murungu, J., Mahaka, I., Kruse-Levy, N., & Torjesen, K. (2022). Engaging HIV-prevention ambassadors to promote oral PrEP among adolescent girls and young women: Results of a Zimbabwe field test. *African Journal of AIDS Research, 21*(3), 287–294.

Iwelunmor, J., Nwaozuru, U., Obiezu-Umeh, C., Uzoaru, F., Ehiri, J., Curley, J., Ezechi, O., Airhihenbuwa, C., & Ssewamala, F. (2020). Is it time to RE-AIM? A systematic review of economic empowerment as HIV prevention intervention for adolescent girls and young women in sub-Saharan Africa using the RE-AIM framework. *Implementation Science Communications, 1*, Article 53.

Nair, G., Celum, C., Szydlo, D., Brown, E. R., Akello, C. A., Nakalega, R., Macdonald, P., Milan, G., Palanee-Phillips, T., Reddy, K., Tahuringana, E., Muhlanga, F., Nakabiito, C., Bekker, L.-G., Siziba, B., Hillier, S. L., Baeten, J. M., Garcia, M., Johnson, S., . . . REACH Protocol Team. (2023). Adherence, safety, and choice of the monthly dapivirine vaginal ring or oral emtricitabine plus tenofovir disoproxil fumarate for HIV pre-exposure prophylaxis among African adolescent girls and young women: A randomised, open-label, crossover trial. *The Lancet HIV, 10*(12), e779–e789.

Ngcobo, S., Scheepers, S., Mbatha, N., Grobler, E., & Rossouw, T. (2022). Roles, barriers, and recommendations for community health workers providing community-based HIV care in sub-Saharan Africa: A review. *AIDS Patient Care and STDs, 36*(4), 130–144.

Velloza, J., Khoza, N., Scorgie, F., Chitukuta, M., Mutero, P., Mutiti, K., Mangxilana, N., Nobula, L., Bulterys, M. A., Atujuna, M., Hosek, S., Heffron, R., Bekker, L.-G., Mgodi, N., Chirenje, M., Celum, C., Delany-Moretlwe, S., & HPTN 082 Study Group. (2020). The influence of HIV-related stigma on PrEP disclosure and adherence among adolescent girls and young women in HPTN 082: A qualitative study. *Journal of the International AIDS Society, 23*(3), Article e25463.

Zeleke, E. A., Stephens, J. H., Gesesew, H. A., Gello, B. M., & Ziersch, A. (2024). Acceptability and use of HIV self-testing among young people in sub-Saharan Africa: A mixed-methods systematic review. *BMC Primary Care, 25*, Article 369.