

Review Article

Gender disparities in HIV infections: A narrative review of the persistent vulnerability of adolescent girls in Sub-Saharan Africa

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Abstract

The human immunodeficiency virus (HIV) epidemic in Sub-Saharan Africa (SSA) disproportionately affects adolescent girls and young women (AGYW), who face a risk of infection up to three times higher than their male peers. SSA accounts for 65% of the global HIV burden, with Eastern and Southern Africa showing particularly high rates. The aim of this study was to examine the persistent gender disparities in HIV infections, focusing on the biological, social, and structural drivers of AGYW's heightened vulnerability. Biological factors such as immature cervical development and hormonal influences intersect with social determinants, including gender inequality, cultural norms, and economic pressures. These factors reduce young women's ability to negotiate safer sexual practices and increase reliance on transactional relationships with older partners. Despite initiatives such as determined, resilient, empowered, AIDS-free, mentored, and safe (DREAMS) and Education Plus, barriers such as stigma, gender-based violence, and limited access to youth-friendly sexual and reproductive health services persist. Addressing these disparities requires multi-level, gender-responsive interventions that strengthen healthcare access, expand female-controlled prevention options, and promote education and economic empowerment. Closing the gender gap in HIV outcomes will demand sustained policy commitment and community engagement tailored to the needs of adolescent girls in SSA.

Keywords: Adolescent girls, HIV prevention, Sub-Saharan Africa, gender disparities, vulnerability



Introduction

Approximately 39.9 million individuals worldwide were living with human immunodeficiency virus (HIV) in 2023, with adults aged 15 and older making up 38.6 million [1] [2]. Meanwhile, children aged 0–14 comprised 1.4 million of the total, and 53% of those living with HIV were women and girls. The overall prevalence rate stood at 0.6% among those aged 15–49 years [1] [2]. Since the virus was first identified, about 88.4 million people have contracted HIV globally, with around 42.3 million AIDS-related deaths [3]. The HIV epidemic remains a persistent public health challenge in Sub-Saharan Africa (SSA), which continues to serve as the global epicentre of infections. In 2021, SSA accounted for approximately 60% of all new HIV cases, with several countries reporting notable increases among young people, particularly females [4]. By 2023, an estimated 25.9 million people in SSA were living with HIV, representing around 65% of global cases [3], underscoring the disproportionate burden borne by the region. Eastern and Southern Africa carry the heaviest share, with 20.8 million cases, while Western and Central Africa account for approximately 5.1 million [1].

Encouragingly, Eastern and Southern Africa have recorded significant progress in recent years. New HIV infections fell by 59%—from 1.1 million to 450,000—and AIDS-related deaths declined by 57% between 2010 and 2023 [3]. Nevertheless, these gains are unevenly distributed. Adolescent girls and young women (AGYW) aged 15–24 still represented 27% of new HIV infections in 2023, and their risk of acquiring HIV remains about three times higher than that of their male peers [4]. While incidence has declined across all primary risk groups from 2010 to 2022, the pace of reduction is slower among gay men and other men who have sex with men (MSM), people who inject drugs, and key female populations such as sex workers and transgender women [5–9]. In Western and Central Africa, new HIV cases decreased by 46% between 2010 and 2023 [5], yet infection rates remain substantial in these high-risk groups. SSA continues to experience a large share of global HIV-related mortality. In 2021, the region accounted for 280,000 of the 650,000 AIDS-related deaths worldwide [10], and in 2023, it contributed a significant proportion of the 630,000 global AIDS-related deaths [3].

Gender disparities are especially stark. In SSA, women aged 15–34 have considerably higher HIV prevalence than their male counterparts [4,5]. Each week, approximately 4,000 adolescent girls and young women become newly infected with HIV globally, with an estimated 3,100 of these infections occurring in SSA [5]. This means that despite comprising a smaller demographic group, AGYW contribute disproportionately to the epidemic, representing about 27% of the 1.3 million new HIV cases worldwide in 2023 [4]. Beyond epidemiological statistics, this disproportionate burden has profound implications for female sexual, reproductive, and mental health [6]. The persistence of this vulnerability is shaped by a complex interplay of biological susceptibility (e.g., immature cervical epithelium and hormonal influences), gender inequality, restrictive cultural norms, sexual coercion, economic dependence, and inadequate access to prevention, testing, and treatment services.

The aim of this study was to critically examine the ongoing susceptibility of AGYW to HIV infections in SSA, identify the biological, social, and structural drivers underlying these disparities, assess the effectiveness of current intervention strategies, and highlight policy and programmatic gaps. By synthesizing evidence from multiple domains, this narrative review seeks to inform more targeted, gender-responsive approaches to reduce new infections and advance equitable HIV outcomes in the region.

Persistent vulnerability of adolescent girls to HIV in Sub-Saharan Africa

Adolescent girls are disproportionately vulnerable to HIV infection due to a combination of biological, socioeconomic, and cultural factors. While risky sexual behaviour plays a role in the high prevalence of HIV among this population, it is insufficient to explain the magnitude of their vulnerability [8]. This calls for a deeper understanding of the biological factors that contribute to this increased risk. The mucosal surfaces of the cervix and vagina in adolescent girls are particularly susceptible to HIV infection. These areas have an increased surface area and

extended exposure time - up to 72 hours - during sexual contact with an infected partner, raising the likelihood of viral transmission [8]. Thinning and dryness of the cervix or vaginal tissues can lead to tears, which further facilitate the penetration of HIV [9]. Additionally, the increased activation of immune cells and the expression of HIV co-receptors in the female genital tract enhance the risk of acquiring HIV. During pregnancy or due to external sources, elevated concentrations of estrogen and progesterone may alter the structure of the genital mucosa or lead to immunological modifications. This can include an increased presence of mucosal lymphoid aggregates or a hormone-induced upregulation of co-receptors linked to HIV infection [8].

Hence, it is suggested that the progesterone-based injectable contraceptive, depot medroxyprogesterone acetate (DMPA), could increase women's risk of acquiring HIV [9,10]. Furthermore, elevated estrogen levels are associated with cervical ectopy in young women, which may raise their likelihood of HIV infection [11]. Sexually transmitted infections (STIs) further increase the vulnerability of adolescent girls to HIV. In particular, Herpes Simplex Virus Type 2 (HSV-2) can cause mucosal injury in the genital area, trigger inflammatory responses, and recruit immune cells (such as macrophages and CD4+ T cells) to the affected areas, which enhances the risk of HIV transmission [11].

Poverty is a significant driver of vulnerability to HIV among adolescent girls in SSA. During adolescence, many girls are pressurised to contribute economically to their families, often at the cost of their education. The lack of education further reduces their economic independence, increasing their susceptibility to sexual exploitation as they depend on multiple partners who may offer financial stability in exchange for sexual favours. In many cases, these partners are likely to be HIV-positive, and adolescent girls often have little bargaining power to negotiate safer sex practices [12]. In addition, inadequate educational attainment and homelessness during childhood, coupled with experiences of sexual violence and risk behaviours, lead to early involvement in sex work [13]. Compared to the developed world, SSA suffers from a notable gap in sex education for adolescent females, attributed to limited development, a shortage of sex education experts, and a poor education system. Additionally, the COVID-19 pandemic may have heightened risks due to extended school closures, a rise in school dropouts, and the loss of family income, compelling AGYW to participate in precarious activities like vending, cross-border trading, and entering marriages with older partners [14]. This deficit, therefore, contributes to the higher HIV prevalence among adolescent girls in SSA, as educational gaps limit awareness and prevention measures.

Cultural norms and gender inequality also play a crucial role in the vulnerability of adolescent girls to HIV in SSA. In many societies, traditional norms that promote male sexual dominance and female subordination can discourage girls from negotiating safer sexual practices. These power dynamics contribute to higher rates of unsafe sex among adolescent girls [13]. In Malawi, Kenya, Zambia, and Botswana, widows are considered impure after their husbands' funerals [6]. Cleansing rituals involve unprotected sex, increasing the risk of HIV and other infections [15]. These rituals also occur after childbirth, miscarriages, and when a fisherman gets a new boat to protect from evil spirits. Sexual cleansing is also believed to purify those with HIV; some African regions think sex with a virgin can cure the disease [15]. Additionally, myths and stigma surrounding HIV further discourage young adolescents from seeking preventive care, such as post-exposure prophylaxis (PEP) and HIV treatment. While male partner cooperation is necessary for prevention methods such as condoms, pre-exposure prophylaxis (PrEP) provides a biomedical alternative for HIV prevention that empowers women with greater autonomy. Although precise figures for access to HIV PrEP among adolescent girls in Sub-Saharan Africa are hard to ascertain, the PrEP adoption rate among young females in the area is still low [14]. This is due to irregular access to PrEP, a lack of adequately trained healthcare personnel, societal stigma, and insufficient personal awareness about PrEP.

Although long-acting antiretroviral therapy (LA-ART) has shown proven efficacy as an innovative therapeutic approach for HIV prevention (PrEP) and treatment [16], the majority of Sub-Saharan African countries cannot access these medications, further increasing HIV vulnerability, particularly among AGYW. Among these drugs are cabotegravir, rilpivirine, lenacapavir, ibalizumab, and dapivirine [15]. The LA-ARTs that are authorized for treating HIV-1 include Cabenuva and Sunlenca (previously known as GS-6207). Cabenuva consists of long-

acting formulations of Cabotegravir (CAB) and Rilpivirine (RPV) administered via intramuscular injections, specifically for adolescents and adults with suppressed viral loads [17,18], and is more effective than traditional oral medications. Sunlenca is a capsid inhibitor-based ART designed for patients with multidrug-resistant HIV-1 strains. The Dapivirine Vaginal Ring (DPV VR), which contains 25 mg of dapivirine, is another innovative method focused on empowering women to prevent HIV. It has gained approval in five African countries: Uganda, Kenya, Zambia, South Africa, and Zimbabwe. According to the World Health Organization (WHO), the ring is advocated for use as an extra preventive strategy for women facing a high risk of HIV-1 infection [19]. This ring provides protection by consistently releasing dapivirine into the vagina using a flexible silicone device that is effective for up to one month.

Gender-based violence and HIV vulnerability among adolescent girls in Sub-Saharan Africa

Gender-based violence (GBV) refers to any form of physical, mental, emotional, or sexual harm inflicted on an individual due to their sex or gender. It encompasses acts like rape, trafficking, genital mutilation, child abuse, and physical harm from intimate partners or other persons. GBV significantly heightens the vulnerability of adolescent girls to HIV, a trend that has worsened notably during the COVID-19 pandemic [20]. Women living with HIV are more prone to intimate partner violence and vice versa, thereby perpetuating a cycle of vulnerability. Additionally, GBV victims are more likely to partake in hazardous sexual activities, further increasing their chances of contracting HIV [21]. Globally, approximately 33% of women aged 15 and older are estimated to experience GBV at least once in their lives [22]. Although underreporting is a concern, the rate of GBV remains alarmingly high in SSA, where it affects about 52% of women [23]. Within this region, intimate partner violence (IPV) is faced by 50% of women, a situation that has deteriorated during the COVID-19 pandemic due to measures such as social distancing, financial hardship, and isolation-related challenges [20]. Additionally, 20% of women face violence that is not related to intimate partners; such incidents often escalate after women disclose their HIV status to their partners [22].

Victims of GBV often experience depression, substance abuse, low self-esteem, physical harm, and issues in sexual and reproductive health, all of which worsen their overall health. These consequences lead to risky sexual behaviors like unprotected sex, non-compliance with HIV prevention and treatment, and drug use as coping strategies [24,25]. Research on urban refugee youth in Kampala revealed that non-communicable diseases and violence heighten HIV risk [26]. Frequent alcohol consumption and IPV were associated with multiple recent sexual partners. Moreover, the combination of IPV, regular alcohol use, and non-partner violence, coupled with major depression, was increasingly linked to engagement in transactional sex [26]. This type of sexual exchange places AGYW at risk of GBV and HIV transmission. Around one-third of women in SSA involved in transactional sex have suffered sexual violence and physical assaults from anticipated transactional partners and may endure it to sustain the relationships as means of livelihood [27,28]. Unfortunately, such victims, especially adolescent girls, are less likely to speak up or seek medical assistance, which can hinder them from knowing their HIV status at an early stage.

Conflicts and HIV vulnerability among adolescent girls in Sub-Saharan Africa

Chronic conflict and its repercussions consistently foster an environment that is prone to sustaining the HIV epidemic. In these challenging situations, especially susceptible populations such as women and children encounter increased HIV risks because of sexual violence, forced labour conditions, and interrupted access to healthcare or testing centres [29]. Poverty, food shortages, the abduction of young girls, sexual assault, and insufficient nutrition are also frequent traits of areas affected by conflict. These conflict-related factors collectively generate a complicated and difficult context for both HIV/AIDS prevention and the provision of healthcare to those impacted. SSA has recorded a good number of conflicts, both within and across national borders. These conflicts have led to mass displacement and, as a result, the displaced individuals frequently engage in risky behaviours, which directly increase their vulnerability to HIV infection [30,31]. Furthermore, armed conflicts profoundly impact the health of a population, especially people living with HIV who are required to maintain a strict adherence to their treatment [32].

Provision of consistent HIV care and supply of medications in conflict-affected zones are extremely challenging, thereby leading to growths in HIV incidence, and associated morbidity and mortality [33], especially among vulnerable groups such as adolescent girls. For instance, in the Central African Republic and South Sudan, which are heavily affected by conflicts, HIV services are practically non-existent [34]. People living with HIV in these zones suffer a double victimisation – initially by the virus and subsequently by disruption of healthcare services, which has in turn made accessing treatment challenging.

Moreover, in war and conflicts, AGYW are particularly vulnerable to economic losses, as well as increased violence and sexual assault [31]. As a result of economic devastation caused by conflicts and restricted access to social assistance, AGYW often have no choice but to engage in transactional sex to meet their survival needs. This is also a strategy for obtaining protection and ensuring a safe departure from conflict zones. In such situations, involvement with multiple sexual partners becomes common, thus heightening the risk of HIV and other sexually transmitted infections.

Current efforts to address gender disparities in HIV vulnerabilities in Sub-Saharan Africa

The determined, resilient, empowered, AIDS-free, mentored, and safe (DREAMS) partnership programme was launched by President's Emergency Plan for AIDS Relief (PEPFAR) to comprehensively tackle the HIV susceptibility of AGYW in sub-Saharan Africa, alongside numerous national governments and private sector collaborators. Launched by the United States Agency for International Development in 2015, this initiative targets African nations struggling with severe HIV issues. It prioritises strategies that aim to uplift AGYW by addressing social determinants such as gender-based violence, limited economic opportunities, and restricted access to secondary education, which heighten HIV vulnerability [35]. By the year 2019, the DREAMS effort succeeded in decreasing new HIV diagnoses among AGYW by at least 25% in nearly all regions where it was implemented [36].

The Education Plus Initiative is also an innovative programme focusing on secondary education as a crucial instrument for HIV prevention, with the goal of reducing HIV risk among AGYW in SSA. It strives to address the alarming numbers of HIV infections and AIDS-related deaths in this demographic. This joint effort by the United Nations Programme on HIV/AIDS (UNAIDS), United Nations Educational, Scientific, and Cultural Organization (UNESCO), United Nations Population Fund (UNFPA), United Nations Children's Fund (UNICEF), and United Nations Entity for Gender Equality and the Empowerment of Women (UN Women) has led to a reduction of new HIV infections by between one-third and one-half among AGYW in some nations [37]. This approach not only protects AGYW from HIV but also fosters their long-term economic independence, health, and well-being. High-level political advocacy is a key component of this approach, mobilizing government decision-makers and donors to champion policy reforms and increase investments in AGYW's health, education, and empowerment [37]. These innovative initiatives urge leaders to uphold their commitments to gender equality and create systemic changes that dismantle the social and structural barriers impacting AGYW while allowing them to gain knowledge, skills, and resilience essential for navigating risks associated with HIV. With documented reductions in HIV-related mortality, virologic failure, and other detrimental health outcomes, community-based interventions have grown in popularity. In low- and middle-income countries, decentralizing services and delegating tasks to community health workers not only reduces costs but also produces outcomes comparable to facility-based services [38].

Challenges to the current approaches for HIV prevention among adolescent girls in Sub-Saharan Africa

Although steps have been taken to lessen the susceptibility of AGYW to HIV in SSA, obstacles such as discrimination and stigma, insufficient awareness, misconceptions, negative attitudes from medical staff, long distances to healthcare centres, cultural and societal hindrances, and the high cost of preventive services continue to exist [4]. Furthermore, many nations in SSA confront limited resources, restricting the range and effectiveness of HIV intervention programmes. This shortage appears as insufficient funding, poor infrastructure, or inadequate training for programme staff. This highlights the necessity to make HIV preventive programmes more

accessible and affordable for young people [39,40]. Insufficient HIV testing among young individuals is another noted issue. This has been ongoing due to a perceived low risk of infection, the psychological impact of having the virus, a lack of privacy at testing centres, extended waiting times [4,41], and limited access to counselling services [40].

Cultural beliefs and their influence on attitudes of people towards HIV prevention are also of significant concern. In some SSA countries, open discussion of sexual health is culturally discouraged, limiting the effectiveness of educational programmes and outreach activities [42,43]. Some African cultures still believe that following a miscarriage or childbirth, a woman ought to undergo unprotected intercourse with a male chosen by community elders to purify her or the infant [44]. These behaviours place AGYW at a higher risk of HIV and other STIs, because the chosen male may have had several sexual partners. Likewise, in some SSA communities where virginity testing is practiced as a rite of passage to marriage, fear of failing such tests leads AGYW to engage in anal sex, thereby increasing their susceptibility to HIV transmission [44].

Furthermore, the stigma accompanying HIV remains a substantial barrier, discouraging people from seeking testing and medical care for fear of social exclusion and harassment. This has an especially strong impact on young people, as it can prevent them from seeking HIV preventive services and actively participating in preventive programmes. Many also face diverse social and structural hurdles that limit their enthusiasm and capacity to seek pre-exposure prophylaxis (PrEP), as they are afraid of being classified as HIV-positive or promiscuous. Although strict legislation on sexual offenders is essential for preventing sexual abuse among AGYW, such policies are often undermined by poor implementation and inadequate political willpower.

Moreover, despite progress in expanding access to antiretroviral therapy (ART), SSA continues to fall behind. Only 77% of people living with HIV in SSA are currently on ART, falling short of the UNAIDS goal of 95% coverage by 2025 [1]. Gender disparities also impact ART uptake. While 83% of women aged 15 and older have access to ART, only 72% of men do, contributing to higher mortality rates among males [45] and increasing the risk of HIV transmission to HIV negative female partners. The convergence of biological susceptibility, entrenched gender inequality, socioeconomic hardship, and restrictive cultural norms sustains high transmission risk in AGYW group, as presented in **Figure 1**.

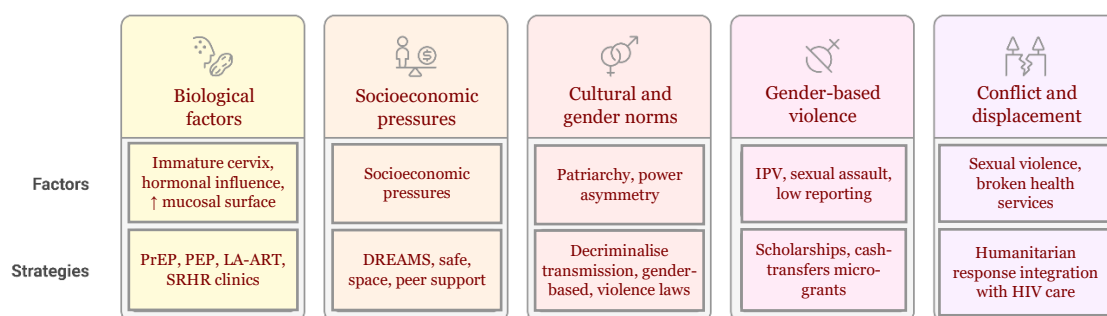


Figure 1. Factors influencing HIV risk among adolescent girls and young women in Sub-Saharan Africa and strategies to address them, covering biological, socioeconomic, cultural, gender-based violence, and conflict-related domains.

Recommendations for future interventions

Policy recommendations

In light of persistent gender disparities and the disproportionate HIV burden among AGYW in SSA, policies should be strengthened or developed where gaps exist, with a focus on eliminating structural and cultural barriers that perpetuate HIV risk. Effective policy must address the prevention of abuse by ensuring the enforcement of laws against GBV, IPV, and child marriage, while promoting safe reporting mechanisms that protect survivors from retaliation and secondary victimization [41]. In particular, patriarchal cultural norms that marginalize young women and normalize intergenerational sexual relationships continue to exacerbate vulnerability to HIV and

must be systematically challenged through policy-driven community engagement and cultural transformation initiatives.

Policies should guarantee access to comprehensive, life skills-based HIV and sexual and reproductive health (SRH) education at both primary and secondary school levels to empower adolescents to protect themselves. Such education must include gender equality training, consent literacy, and information on biomedical prevention methods such as oral and long-acting PrEP. Evidence from South Africa shows that consistent school-based HIV education reduces risky sexual behaviour and increases uptake of prevention services among adolescent girls [46,47]. Food insecurity remains a critical socioeconomic challenge for women living with HIV in SSA, often leading to inconsistent adherence to ART due to the side effects of taking medication without adequate nutrition [46,47]. Policy measures should integrate social protection programmes, such as conditional cash transfers, food vouchers, and agricultural support schemes, directly into HIV treatment plans. In addition, counseling and adherence support should actively involve families and community networks, as these are shown to improve retention in care and viral suppression rates [48].

Laws criminalizing HIV transmission, exposure, and non-disclosure continue to undermine HIV prevention by discouraging voluntary testing, reducing access to treatment programs, and deterring individuals from disclosing their status due to fear of legal consequences [49,50]. Reforming these laws is critical to remove counterproductive provisions and create an enabling environment for HIV prevention and care. Such reforms should be accompanied by legal literacy campaigns that inform communities about rights and responsibilities under the law, as well as strengthened confidentiality safeguards within healthcare systems. Promoting gender-sensitive HIV policies is crucial for a balanced approach that does not disproportionately burden women or expose them to potential violence. Encouraging male engagement in HIV testing and reducing the stigma associated with male HIV services is also essential [49,50].

Gender-sensitive HIV policies are also essential to ensure that prevention and treatment services do not disproportionately burden women or expose them to violence. This includes creating policy frameworks that integrate GBV screening and referral systems into routine HIV care [40,41]. In addition, policy must promote the active engagement of men in HIV testing and treatment to reduce stigma and encourage shared responsibility for prevention. Published studies have shown that targeted male engagement campaigns, coupled with community-based testing, significantly improve HIV testing uptake among men while reducing negative stereotypes about male HIV services [26,51]. More importantly, policy implementation should be guided by measurable targets, clear budget allocations, and regular monitoring using sex- and age-disaggregated indicators. Transparent accountability mechanisms at national and subnational levels are crucial to ensure that commitments translate into tangible improvements in HIV outcomes for AGYW in SSA.

Policies should be improved—or developed where unavailable—and implemented to remove all obstacles to the prevention of abuse among AGYW, encourage treatment adherence, and lessen stigma due to patriarchal cultural norms marginalising and supporting GBV and intergenerational sexual relationships that exacerbate the vulnerability of AGYW to HIV infections [41]. Policies that empower adolescents to protect themselves against HIV are essential for enabling informed decisions regarding their sexual health, supported by consistent, life skills-based HIV education programmes at the primary and secondary levels. Food insecurity is a socioeconomic issue faced by women living with HIV in SSA, and this has an impact on their level of adherence to ART. Policies should incorporate social protection programmes, counselling, and continuing assistance, and involve families and communities in supportive roles to guarantee adherence [49,50].

Healthcare strategies

Improving access to PrEP and PEP is crucial to addressing the disparities in HIV infections among AGYW in SSA. However, stigma and discrimination from healthcare providers and the cost of travelling to health centres offering these services are major obstacles frequently encountered by AGYW [52]. Addressing these issues can be accomplished through the introduction of long-acting options such as injectable cabotegravir, which provides a convenient

alternative for ongoing HIV prevention, the elimination of costs associated with PrEP and PEP services, and the creation of youth-friendly corners at health facilities to create supportive and nonjudgmental spaces for AGYW [44].

Addressing gender disparity in HIV management also depends on improving AGYW's access to sexual and reproductive health and rights (SRHR) services that guarantee the provision of family planning, STI, bacterial vaginosis screening, and treatment [44]. Providing these services at no cost while locating the facilities proximal to AGYW's communities in a youth-friendly setting that promotes regular use can improve accessibility to these services [29].

Community-based approaches

The gender disparity in HIV infections among AGYW in SSA and beyond can be addressed through community-based HIV prevention strategies. This can be actualized by establishing welcoming spaces where HIV education and awareness are readily available. Involvement of community-led groups is crucial, especially those organised by young women living with HIV. These groups can ensure that HIV interventions are inclusive, pertinent, and represent the experiences of those who are most impacted [53,54]. Promoting critical consciousness, strengthening community leadership, enhancing social cohesion, building community networks, investing in local organizations, integrating community mobilization with health programming, strengthening sustainable community capacity for HIV prevention, and encouraging multi-sectoral collaboration are all crucial to addressing the gender disparity in HIV infection across Africa [44,54]. Sports activities, mentoring programmes, and youth centres which offer a secure environment for education, socialisation, and self-determination—are examples of these interventions, with beneficial effects, dispelling stigma and misinformation while boosting confidence and positive attitudes towards HIV prevention. This underscores the importance of youth centres in the provision of social supports that promote health-seeking behaviours by acting as venues for mentorship and peer support [55,56] within the community. Strategies must include thorough assessment designs while prioritising the most vulnerable populations, such as AGYW, to enhance these interventions.

Innovative prevention strategies

Technology-based sexual health interventions that are youth-friendly can be a transformative prevention strategy for HIV infections among adolescent girls in SSA. Leveraging digital health technologies, including eHealth and mHealth that utilise smartphones, computers, and text messaging, can be used to reach adolescents efficiently and affordably [57]. These platforms provide privacy, comfort, and individually tailored health messages, making them particularly beneficial to the digitally native youths. Technology-based interventions can improve sexual health knowledge, promote safer sex practices, and increase condom use and STI testing, especially for adolescent girls [58]. Tailoring content to specific needs and maintaining regular sessions further enhances the impact of these interventions. By prioritizing these youth-centered strategies, policymakers can create a more inclusive and impactful response to the HIV epidemic among adolescent girls in SSA [58,59]. Furthermore, engaging AGYW, raising awareness, and encouraging an optimum utilisation of these services can be achieved through the use of digital and social media channels to provide SRHR information. When combined, these programs give AGYW the tools and assistance they need to make wise health decisions, which eventually helps to achieve the larger objective of lowering HIV inequalities in SSA [29].

Conclusion

The persistent vulnerability of adolescent girls to HIV infection in SSA remains a critical public health concern and a stark manifestation of gender disparities in the epidemic. This study highlights that, despite overall declines in incidence, adolescent girls continue to bear a disproportionate share of new infections compared to their male peers. Inadequate access to youth-friendly healthcare, coupled with limited availability and uptake of female-controlled prevention tools such as PrEP, further undermines progress. Addressing this inequity requires a multi-pronged, gender-responsive strategy that confronts the root causes of vulnerability while meeting immediate health needs. This includes strengthening health systems to deliver

accessible, youth-centered sexual and reproductive health services; expanding comprehensive, culturally sensitive sexual education; and advancing economic empowerment programs that reduce financial dependency and transactional risk. Coordinated action across policy, healthcare, community, and educational domains is essential to close the gender gap in HIV outcomes and ensure that adolescent girls in SSA are no longer left behind in the fight against HIV.

Ethics approval

Ethics approval was not required.

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Competing interests

All the authors declare that there are no conflicts of interest.

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Underlying data

Derived data supporting the findings of this study are available from the corresponding author on request.

Declaration of artificial intelligence use

Tools such as quillbot and writefull were used for paraphrasing.

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