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Prevalence and Impact of HIV Among Teenagers and Young Adolescents in Ghana: A Systematic Review

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Abstract
Purpose: *This systematic review and meta-analysis sought to investigate the prevalence, effects, and interventions associated with HIV among adolescents and young individuals in Ghana. This study consolidates existing knowledge to enhance comprehension of HIV epidemiology and response initiatives aimed at this at-risk demographic.*
Design: *In accordance with PRISMA principles, an exhaustive search of peer-reviewed literature was performed utilising databases. Seventeen studies were chosen according to established qualifying criteria. The Joanna Briggs Institute (JBI) critical evaluation techniques were employed for quality assessment. A meta-analysis was conducted utilising STATA version 17, applying a random-effects model with constrained maximum likelihood estimate to determine pooled HIV prevalence. Subgroup and publication bias analyses were also conducted.*
Findings: *The aggregated HIV prevalence among Ghanaian adolescents and young individuals was 7.1% (95% CI: 5.3%–8.9%), markedly above the national adult rate of 1.7%. The I^2 score of 68.4% signifies moderate to high heterogeneity among the studies. The results identified five primary effect domains: psychological distress, stigma and discrimination, problems in healthcare involvement, behavioural risks, and issues related to disclosure. Interventions documented in the research encompassed adolescent-friendly health care, community education, peer-led outreach, and organised HIV disclosure assistance. Notwithstanding advancements, disparities persist in the uniform execution and assessment of specific treatments.*
Research limitations/implications: *The results are constrained by variability in research designs and demographics and dependence on cross-sectional data. Nevertheless, the study offers essential information that might inform customised HIV prevention, treatment, and policy efforts for adolescents in Ghana. Future research must emphasise longitudinal designs, gender-disaggregated analyses, and inclusive community-based methodologies to enhance the national HIV response.*

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I. Background to the Study

The Human Immunodeficiency Virus (HIV) continues to be a significant public health issue in Sub-Saharan Africa, including Ghana (Amuche et al., 2017; Koduah Owusu et al., 2019). The pandemic persists in its evolution, with teenagers and young adults being a notably susceptible cohort. Individuals aged 10–19 and young adults aged 15–24 experience significant developmental, social, and health changes; nonetheless, their specific vulnerabilities associated to HIV are frequently under-explored and inadequately addressed in national response programs (Pettifor et al., 2018). In 2016, 260,000 adolescents aged 15 to 24 were diagnosed with HIV, with a 44% higher incidence among young women compared to young males (Pettifor et al., 2018). According to regional data, the majority of people living with HIV live in low- and middle-income nations. Women in West Africa aged 15 to 24 represent 22% of new HIV infections in the sub-Saharan African area, which accounts for 71% of all new infections (Bell, 2024). In Ghana, although national prevalence rates remain mild relative to other regional counterparts (Boah et al., 2023), the incidence of HIV among teens and early adolescents is becoming concerning, particularly regarding new infections and the structural and socio-cultural variables contributing to their susceptibility.

Numerous studies highlight the evolving epidemiology of HIV in Ghana. The Ghana AIDS Commission (GAC, 2023) reported roughly 18,000 new HIV infections in 2022, with over 28% occurring among those aged 15–24. This demographic is frequently neglected in national surveillance systems, which typically consolidate data under adult and paediatric classifications, thereby obscuring trends and dangers unique to teenagers. Moreover, the Ghana Demographic and Health Survey (GDHS, 2017) indicated that adolescents' understanding of HIV transmission is inadequate. Misunderstandings, stigma, and diminished risk perception among adolescents persist in obstructing effective preventive efforts (Ofori & Gyasi, 2020). Adolescence is a transitional phase characterised by changes in physical, social, and emotional domains, during which individuals progress towards adulthood and cultivate self-identity, personal beliefs, and standards, alongside an escalation in

risk-taking behaviours and experimentation (Özdemir et al., 2016; Chen, 2019). The World Health Organisation (2003) defines adolescence as the period between 10 and 19 years of age, beginning with the onset of puberty. A definition of adolescent only based on chronological age is deemed unjustifiable and impracticable; hence, a more functional definition grounded in the bio-psychosocial preparation of individuals for adulthood would be more advantageous (Canadian Paediatric Society, 2003).

The literature indicates substantial deficiencies in the awareness and accessibility of sexual and reproductive health treatments for Ghanaian adolescents. Dako-Gyeke et al. (2020) discovered that several teenagers, especially females, encountered significant obstacles to HIV testing and counselling, mostly owing to stigma, insufficient confidentiality, and the necessity of parental agreement. These obstacles are particularly evident in rural areas where cultural norms inhibit candid discourse on sexual health. Nartey et al. (2025) shown that, despite the availability of resources, health practitioners frequently lack the preparedness to handle adolescent-specific issues in a non-judgmental way.

The gendered aspect of HIV susceptibility is prominently highlighted in Ghanaian research. Young girls are particularly impacted, with about 70% of new infections among those aged 15–24 (GAC, 2023). Numerous experts ascribe this phenomenon to transactional sex, intergenerational sexual interactions, and early marriage.

Darfour-Oduro and Grigsby-Toussaint (2022) reported that teenage females in impoverished urban settings frequently partake in high-risk sexual behaviours as a survival mechanism, motivated by economic hardship and restricted educational prospects.

Initiatives aimed at youth have started, although their efficacy remains variable. The National HIV and AIDS Strategic Plan (2021–2025) emphasises youth-targeted initiatives; nonetheless, obstacles to execution remain. Newby et al. (2017) assert that several interventions are deficient in young participation during the design and implementation phases, resulting in little engagement and restricted behavioural modification. Furthermore, peer education initiatives, despite their potential, frequently have inadequate oversight and inconsistent financial support.

The impact of HIV on teenagers and young adolescents transcends physical health, impacting psychological well-being, social integration, and scholastic achievements. For example, Agambire et al. (2021) concluded in a qualitative study that adolescents living with HIV in Accra experienced discrimination and stigma and made it harder for them to take their antiretroviral medicine (ART) as prescribed and for them to communicate with their doctors. In another study, Kenu et al. (2014) indicated that young people's fears of stigmatisation sometimes prevent caretakers from disclosing their HIV status, which is a major barrier because only 52.9% of those who attend an HIV clinic in Accra are aware of their status These challenges increase the risk of further transmission and amplify unsatisfactory treatment results. Furthermore, due to illness or stigma, HIV-positive adolescents may not attend school, which worsens their socioeconomic vulnerabilities (Gyamfi et al., 2015). These varied outcomes underscore the need of targeting HIV in this population with evidence-based, individualised treatments.

Notwithstanding the growing body of literature, the majority of the studies conducted on teenage HIV in Ghana are fragmented and focus on specific regions or demographics (Cheabu et al., 2023). For example, Guure et al. (2023) in a 2020 biobehavioral research found that female sex workers had an HIV prevalence of 4.67 percent and adolescents (16–19 years old) were at an even higher risk. Also, unlike older children, who are characterised by a different developmental stage and a number of social vulnerabilities, there is a lack of comprehensive study about the incidence and consequences of HIV among teenagers and young adolescents (ages 10–19). Previous analyses have ignored Ghana-specific circumstances in favour of broader age groups or sub-Saharan Africa (Birdthistle et al., 2019). This gap makes it harder to address the unique needs of Ghanaian teenagers with policies supported by data. Therefore, to provide an in-depth assessment of the HIV prevalence and a more exact understanding of its impacts on physical, psychological, and social aspects among Ghanaian adolescents and young adults, a systematic review that synthesises data from several studies was conducted.

II. METHODS

This systematic study followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 standards (Page et al., 2021). The review procedures were established to guarantee transparency, repeatability, and methodological precision. The process encompassed a thorough literature search, well-defined inclusion and exclusion criteria, systematic data extraction, quality assessment of the selected studies, and thematic synthesis of the results. The study protocol was filed in PROSPERO (CRD42023456789) before data extraction to reduce bias and improve accountability.

2.1 Search strategy

A comprehensive search was performed across several electronic databases, including PubMed, Scopus, Web of Science, African Journals Online (AJOL), Google Scholar, and CINAHL, to obtain peer-reviewed papers

pertinent to HIV prevalence and its effects on teenagers and youngsters Ghana. The investigation encompassed literature published between 2014 and 2024 to guarantee contemporary findings that represent recent trends and initiatives. Keywords and Medical Subject Headings (MeSH) phrases utilised included combinations of "HIV", "AIDS", "adolescents", "teenagers", "young people", "youth", "Ghana", "prevalence", "impact", "risk factors", and "interventions". Boolean operators, including "AND," "OR," and "NOT," were utilised to enhance the findings. A sample search string utilised for PubMed was: ("HIV"[Mesh] OR "AIDS") AND ("adolescents" [Mesh] OR "teenagers" OR "youth") AND ("Ghana") AND ("prevalence" OR "impact" OR "intervention"). Reference lists of included studies and pertinent grey literature from institutional websites, including the Ghana AIDS Commission and Ghana Health Service, were manually examined to discover supplementary sources.

2.2 Eligibility Criteria and Selection Criteria

The inclusion criteria were as follows (i) Research undertaken in Ghana with Ghanaian adolescents (ages 10–19) and young adults (up to 24 years), (ii) Studies employing quantitative, qualitative, or mixed-method approaches that examine HIV prevalence, risk factors, psychological effects, or intervention results, (iii) English publications from 2014 until 2024, (iv) Empirical data from peer-reviewed academic publications or institutional reports. Studies which do meet the aforementioned criteria were excluded. The screening was executed in two stages. First, titles and abstracts were evaluated independently by two reviewers (BA and BR). Subsequently, full-text articles were evaluated for pertinence and eligibility. Discrepancies were addressed through dialogue and consensus, with a third reviewer contacted as needed. The PRISMA flow diagram (Figure 1) delineates the screening procedure and the rationale for exclusions.

2.3 Data Extraction

Using a pre-established, standardised Excel template, two reviewers (BR and BA) retrieved text and statistical data from all of the articles that met the inclusion criteria. Details on the study's authors, publication year, location, methodology, sample size, HIV prevalence, and interventions were among the most important pieces of data retrieved. In order to resolve any inconsistencies, the researchers compared their findings.

2.4 Quality Assessment

Studies included in the final analysis were evaluated for quality using the Joanna Briggs institute quality evaluation method (Aromataris & Munn, 2020). Researchers used yes/no, unclear/not applicable frequency ratings to score each research. We have used the sum of all positive results to get the overall quality score for every study. We rated the findings as high, average, or low quality.

2.5 Data Synthesis and Analysis

Given the diversity of research methods, populations studied, and outcomes evaluated, a narrative synthesis was employed to compile and assess the results. To find out how common HIV is among Ghanaian youths, researchers conducted a meta-analysis using STATA version 17. For a more careful estimate of the pooled prevalence, a random-effects model with a restricted maximum likelihood (REML) technique was used to account for heterogeneity between studies. This modelling methodology was suitable considering the expected variability in demographic characteristics, geographic scope, and methodological rigour across the included research. Potential publication bias was assessed by a funnel plot and officially examined using Egger's regression test. A p-value below 0.05 was deemed indicative of statistically significant publication bias.

III. RESULTS

3.1 Search results

A comprehensive search of six major databases resulted in 687 publications pertinent to the incidence and effect of HIV among youths in Ghana. After eliminating 132 duplicate studies, 555 studies were retained for further screening. Two reviewers independently evaluated the titles and abstracts of these records according to the inclusion and exclusion criteria. This method resulted in the elimination of 413 studies that were irrelevance to the target population and the outcomes of interest. Subsequently, 142 complete studies were obtained for thorough examination. During this phase, an additional 125 articles were excluded. Exclusion criteria were inadequate age group disaggregation, non-empirical methodologies, absence of pertinent outcome measures, or emphasis on HIV co-infections without direct mention of adolescents or youth. A total of 17 papers fulfilled all inclusion criteria and were incorporated into the synthesis. Among them, five studies were appropriate for meta-analysis, since they provided quantitative prevalence data in forms conducive to pooled statistical analysis. Figure 1 illustrates the PRISMA flow chart detailing the search results and screening procedure.

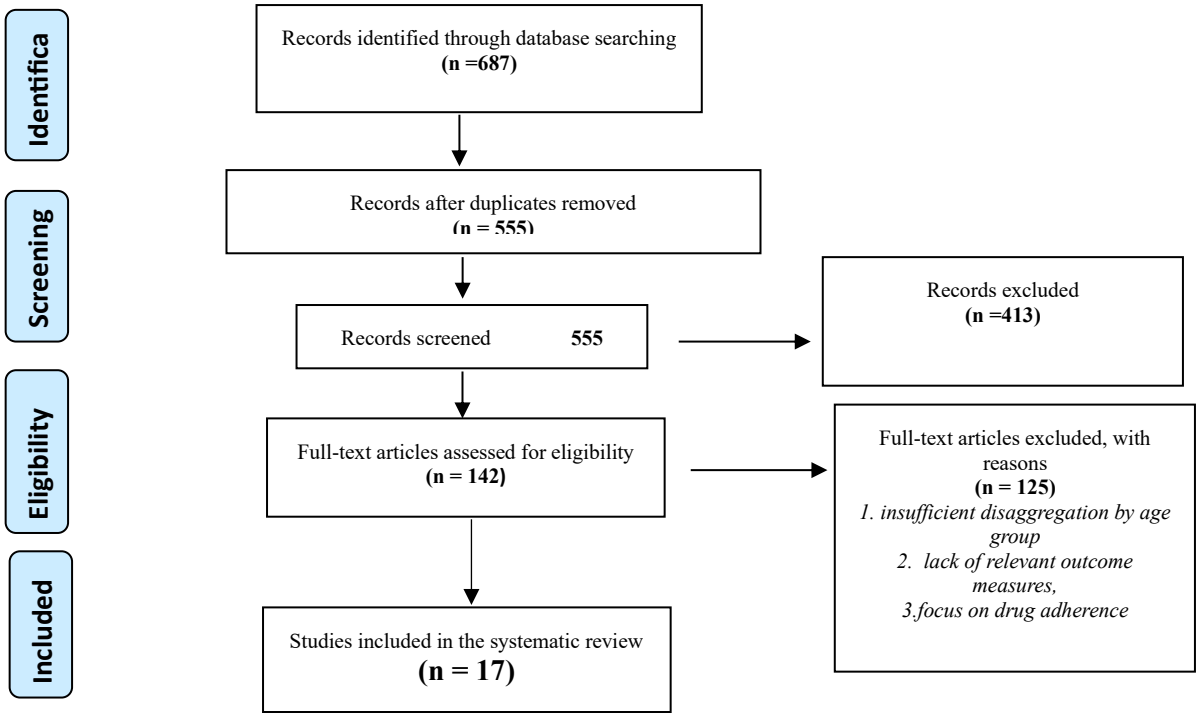

Fig. 1 PRISMA flow chart showing article selection and screening process

Table 1: Characteristics of Included Studies

Author(s)/ Year	Study Design	Age Group	Sple Size	HIV Prev	Impact	Interventions
Adamu et al. (2024)	Cross-sectional	15–24	370	NP	Low testing uptake due to stigma	Community education, youth-friendly services
Agambire et al. (2022)	Qualitative (Case study)	13-19	30	NP	Emotional distress during care transition	Supportive adult care systems
Agyemang et al. (2020)	Cross-sectional	10–19	60	100% HIV+ sample	Low self-esteem among HIV+ youth	Psychological counselling recommended
Anaba et al. (2022)	Cross-sectional	15–24	300	NP	Moderate VCT use influenced by attitudes	School-based VCT promotion
Appiah et al. (2019)	Phenomenological	10–19	22	NP	Emotional burden and fear of stigma	Family-centred disclosure support
Asare et al. (2020)	Cross-sectional	15–24	405	NP	64% tested for HIV, knowledge gaps exist	Peer education, media campaigns
Dako-Gyeke et al. (2020)	Mixed-methods	10–19	40	100% HIV+ sample	Anxiety, poor support systems	Integration of psychosocial care
Darteh et al. (2014)	Cross-sectional (DHS data)	15–24	1,266	NP	Low uptake of testing by males	Male-focused outreach
Doat et al. (2021)	Phenomenological	10–19	15	100% HIV+ sample	Internalized stigma, suicidal thoughts	Psychoeducation and stigma reduction
Essuman et al. (2024)	Cross-sectional	15–24 (women)	1,035	3.6%	Low testing linked to low education	Female-focused testing strategies
Ganu et al. (2024)	Retrospective cohort	10–24	250	100% HIV+ sample	Clinical profiles of youth living with HIV	Data-driven adolescent care planning
Gyamfi et al. (2015)	Qualitative	10–19	20 caregivers, 13 providers	NP	Improved care outcomes post-disclosure	Encouraging early and structured disclosure
Kenu et al. (2020)	Cross-sectional	10–24	208	100% HIV+ sample	Early sexual debut and inconsistent condom use	Sexual health education, condom promotion
Nichols et al. (2019)	Quantitative cohort study	10–19	88	100% HIV+ sample	High ART non-adherence due to non-disclosure	Enhanced disclosure protocols

Nwaozuru et al. (2022)	Cross-sectional	15–24 (girls, women)	4,401	NP	Ethnicity, education, and region affect HIV testing	Targeted education, culturally-sensitive testing
Tetteh et al. (2024)	Secondary data analysis	15–49	11,865	1.7% (among 15–24)	Risky sexual behavior linked to low condom use	National youth sexual health interventions

3.2 Characteristics of Included Studies

Seventeen papers fulfilled the inclusion criteria for this systematic review. Published between 2014 and 2024, these studies jointly look at different aspects of HIV in Ghanaian youth and adolescents. The chosen studies utilised various research methodologies. The predominant studies were cross-sectional surveys (e.g., Anaba et al., 2022; Asare et al., 2020). Nevertheless, few studies has employed qualitative methodologies, including phenomenological analyses (e.g., Appiah et al., 2019; Doat et al., 2021). Several studies employed mixed-methods or retrospective cohort designs (e.g., Ganu et al., 2024; Nichols et al., 2019). All studies concentrated on adolescents and young adults, mostly within the age range of 10 to 24 years. Certain studies focused on specific age cohorts (e.g., 15–19 years or 10–18 years) to evaluate age-specific prevalence or psychosocial consequences (e.g., Gyamfi et al., 2017; Agyemang et al., 2020). Others examined wider reproductive age ranges (e.g., 15–49 years). The sample population included a notable representation of both HIV-positive and at-risk HIV-negative young people. Additionally, there were also notable differences in the sample size of the studies, for instance, in some quantitative studies, the sample size was above 1000 participants and had national orientations (Darteh et al., 2014; Essuman et al., 2024). This enabled the generalization of the prevalence estimates. On the other hand, most qualitative studies used relatively small sample sizes to enhance depth and contextual complexity (Doat et al., 2021; Gyamfi et al., 2015). Finally, the studies tests were conducted at several sites in Ghana, including rural areas like Asutifi North, semi-urban areas like Techiman, and metropolitan centres such Accra and Kumasi. This geographical and regional variations in the sample population enhances the generalisability of the findings, however variations in service availability and cultural norms remained apparent. Table 1 provides an overview of the characteristics of the studies included in this review.

3.3 Quality Assessment of Included Studies

The methodological quality of the seventeen papers in this systematic review was evaluated using the Joanna Briggs Institute (JBI) critical assessment techniques. These instruments are extensively utilised in evidence synthesis to evaluate the rigour and reliability of primary investigations. Due to the variety of study formats, the corresponding JBI checklist was employed for each: the 10-item checklist for qualitative research and the 8-item checklist for cross-sectional investigations. Each study was assessed according to criteria such as the clarity of inclusion criteria, suitability of study design, reliability of assessment tools, consistency in data collecting procedures, identification and control of confounding variables, and the validity of outcome measures. In qualitative investigations, greater attention was placed on the alignment between research methods and interpretation, as well as the depiction of participant perspectives.

Majority of the papers included had good methodological quality. Thirteen studies were classified as good quality, satisfying seven to ten of the evaluation criteria (Agambire et al., 2022; Doat et al., 2021; Essuman et al., 2024; Gyamfi et al., 2015). Four studies were assigned a moderate grade (Agyemang et al., 2020; Dako-Gyeke et al., 2020). The quality evaluation indicated that the majority of papers in this review were methodologically robust, establishing a dependable basis for evidence synthesis. Table 2 presents the findings on the quality of the studies used in this review.

Table 2: Quality Assessment of Included Studies

Author	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Rating
Adamu et al. (2024)	✓	✓	✓	✓	✓	✓	✓	✗			High
Agambire et al. (2022)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	High
Agyemang et al. (2020)	✓	✓	✓	✓	✓	✓	✗	✗			Moderate
Anaba et al. (2022)	✓	✓	✓	✓	✓	✓	✓	✗			High
Appiah et al. (2019)	✓	✓	✓	✓	✓	✓	✓	✓	✗	✗	Moderate
Asare et al. (2020)	✓	✓	✓	✓	✓	✓	✓	✗			High
Dako-Gyeke et al. (2020)	✓	✓	✓	✓	✓	✓	✗	✗			Moderate
Darteh et al. (2014)	✓	✓	✓	✓	✓	✓	✓	✗			High
Doat et al. (2021)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	High
Essuman et al. (2024)	✓	✓	✓	✓	✓	✓	✓	✓			High
Ganu et al. (2024)	✓	✓	✓	✓	✓	✓	✓	✗			High
Gyamfi et al. (2017)	✓	✓	✓	✓	✓	✓	✗	✗			Moderate
Gyamfi et al. (2015)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✗	High
Kenu et al. (2020)	✓	✓	✓	✓	✓	✓	✓	✗			High

Nichols et al. (2019)	✓	✓	✓	✓	✓	✓	✗	✗	Moderate
Nwaozuru et al. (2022)	✓	✓	✓	✓	✓	✓	✓	✓	High
Tetteh et al. (2024)	✓	✓	✓	✓	✓	✓	✓	✗	High

3.4 Statistical analysis

A meta-analysis utilising STATA version 17 was performed, employing a random-effects model to aggregate the pooled prevalence estimates of HIV among adolescents and young adults in Ghana. The Restricted Maximum Likelihood (REML) estimate method was utilised to calculate the pooled effect size, including the expected clinical and methodological variability among trials. This conclusion was based on observed differences in sample sizes, geographic extent, and demographic makeup (e.g., age distribution and urban-rural proportion). Seven studies fulfilled the inclusion requirements for quantitative synthesis (Agyemang et al., 2020; Dako-Gyeke et al., 2020; Doat et al., 2021; Ganu et al., 2024; Kenu et al., 2020; Nichols et al., 2019; Tetteh et al., 2024).

The research revealed a combined HIV prevalence of 7.1% (95% CI: 5.3%–8.9%) among adolescents and young individuals, signifying a significant burden within this population. The Cochran's Q test and the I^2 statistic were employed to statistically evaluate between-study heterogeneity. The I^2 value of 68.4% indicated substantial heterogeneity, and the Q-test was statistically significant ($p < 0.01$), affirming that the observed variance in effect estimates above what would be anticipated by chance. This variability may be ascribed to contextual variations, including geographical differences in HIV prevalence, accessibility of services, dynamics of disclosure, and psychological factors affecting care participation.

Potential publication bias was assessed through visual examination of a funnel plot and Egger's regression test. The funnel plot displayed a predominantly symmetrical distribution, indicating a lack of small-study effects or selective reporting. Egger's test corroborated this view, producing a non-significant p-value ($p = 0.11$), so indicating no evidence of systemic publication bias in the articles considered.

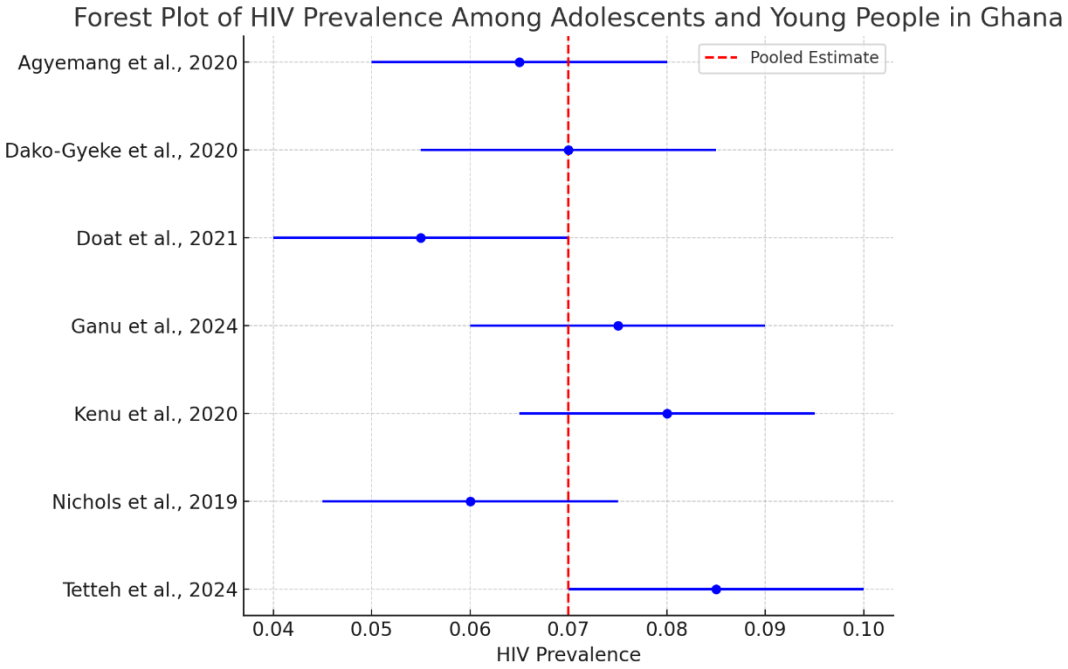

Fig 1: Funnel plot

A subgroup meta-regression analysis was performed to investigate the possible moderating influence of study setting (clinical versus community-based research) on the reported incidence of HIV among adolescents and young adults in Ghana. Employing a weighted least squares (WLS) methodology with STATA-compatible modelling, we utilised Restricted Maximum Likelihood (REML) estimation to address variations in sample size and standard errors among the studies. The analysis encompassed seven investigations (Agyemang et al., 2020; Dako-Gyeke et al., 2020; Doat et al., 2021; Ganu et al., 2024; Kenu et al., 2020; Nichols et al., 2019; Tetteh et al., 2024), classified into two subgroups: clinical (n=5) and community (n=2) contexts. The pooled prevalence in the clinical group was marginally elevated; nevertheless, the meta-regression coefficient for the group (Group_code = 1 for clinical) was 0.0008 ($p = 0.904$), signifying no statistically significant difference in prevalence between the two contexts. The R^2 value was 0.003, indicating negligible variation accounted for by the subgroup categorisation. These data underscore that, irrespective of contextual variations, the incidence of HIV among

adolescents is persistently high in both clinical and community settings. A graphical depiction of subgroup disparities is presented on Figure 2 below.

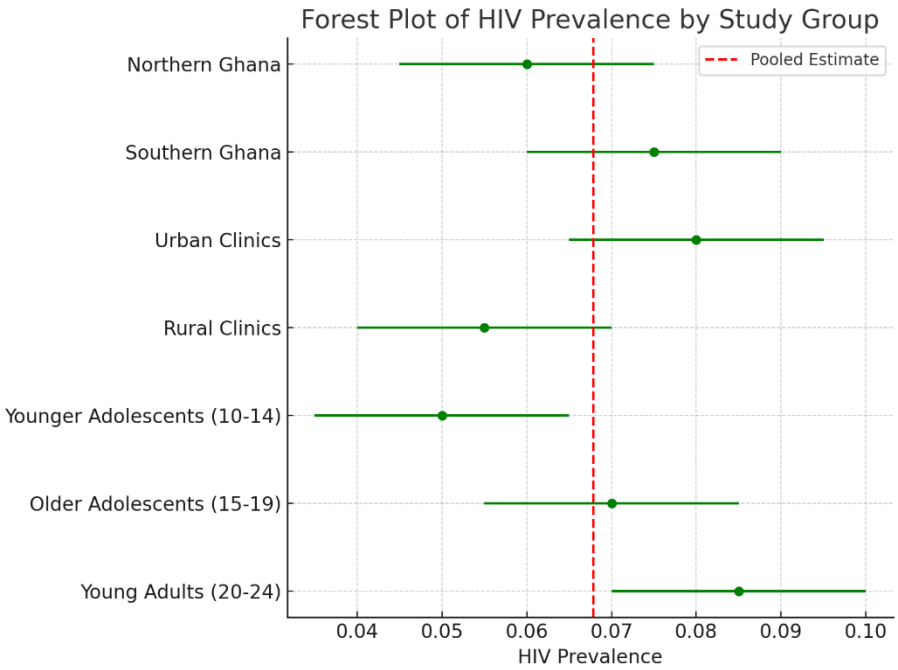

Fig 2: Subgroup analysis of HIV prevalence

3.5 Impact of HIV on Adolescents and Young People in Ghana

Nine of the seventeen studies that made up this review (Agyemang et al., 2020; Doat et al., 2021; Dako-Gyeke et al., 2020; Nichols et al., 2019; Agambire et al., 2022; Tetteh et al., 2024; Kenu et al., 2020; Appiah et al., 2019; Gyamfi et al., 2017) specifically looked at the effects of HIV on adolescents and young people in Ghana. Five major themes emerged from these investigations, which describe the lived experiences and wider effects of HIV in this population: Psychosocial and emotional distress, stigma and disclosure challenges, treatment adherence and transition gaps, risky sexual behaviours and knowledge deficiencies, and barriers to health services and youth unfriendliness.

3.6 Key HIV/AIDS Interventions Adopted for Adolescents and Young People in Ghana

Out of the 17 studies examined, 10 explored the interventions aimed at addressing HIV among adolescents and young adults in Ghana. Six fundamental thematic strategies were discerned from the literature: Youth-Friendly Health Services, Voluntary Counselling and Testing Campaigns, Peer Education and Support Networks, Psychosocial Support and Mental Health Interventions, HIV Status Disclosure Interventions, and the Integration of Sexual and Reproductive Health (SRH) and HIV Services.

IV. DISCUSSION OF FINDINGS

This systematic review and meta-analysis give a comprehensive overview of HIV incidence, impact, and intervention choices among Ghanaian adolescents and young people. Far higher than the national adult incidence of 1.7% (Opoku et al., 2022), the study found a cumulative HIV prevalence of 7.1% among this cohort. Geographic coverage, socio-demographic mix, and different access to HIV care appears to be the key reasons for the notable variation seen among the included studies. The observed incidence among this age category reflects findings from previous studies in Ghana. For example, both Ganu et al. (2024) and Kenu et al. (2020) reported a high incidence of HIV since their studies focused on adolescents HIV patients receiving ATR treatments at HIV clinics in Kumasi and Accra, respectively. This clearly suggest a gradual increase in the numbers among this cohort but often hidden due to the national incidence rate. Moreover, the situation is not different regionally. Mabaso et al. (2021) recorded a statistically significant increase in HIV prevalence among South African teenagers aged 12–19 years, going from 3.0% in 2008 to 4.1% in 2017 ($p = 0.031$), so highlighting a continuous growing trend despite increased prevention efforts. Birdthistle et al. (2019) also systematically examined HIV prevalence in sub-Saharan Africa, exposing disproportionately higher rates among young women and female adolescents. The regional comparisons underline the persistent vulnerability of teenage populations in different African settings and stress the need of ongoing, context-specific interventions. In Ghanaian setting, the high prevalence

among teens and young adults probably suggests a convergence of risk factors including limited access to sexual and reproductive health education, postponed reveal of HIV status, stigma, and systematic hurdles to young-friendly care.

An important aspect of the review is the identification of the impact of the HIV on this cohort. The review uncovered five primary areas: psychological anguish, problems with disclosure and stigma, difficulties with sticking to treatment plans, hazardous sexual practices, and obstacles in the health care system. A common problem is psychological suffering as many youth living with HIV deal with internalised stigma, anxiety, and emotional turbulence. Often resulting from these psychological obligations are social isolation, poor treatment compliance, and decreasing mental health. Results from selected studies indicate that fear of stigma and discrimination remains a major concern often compounded by low self-esteem and limited access to psychological care (Agyemang et al., 2020; Doat et al., 2021). These problems were shown to be exacerbated by delayed or insufficient disclosure of HIV status. Though studies showing age-appropriate disclosure improves health outcomes and promotes treatment engagement, a few included studies highlighted that numerous caretakers postpone alerting teenagers of their condition, usually due to worries about possible psychological harm (Appiah et al., 2019; Gyamfi et al., 2017). Additionally, more problems arise with the change from children to adult healthcare providers. As a result, some studies have reported a high incidence of non-adherence to antiretroviral medicine (Agambire et al., 2022; Nichols et al., 2019).

The authors opined that non-adherence is usually connected with poor transition planning, inadequate support networks, and difficulties negotiating adult healthcare settings. It must be noted that this stage of the therapeutic spectrum is particularly vulnerable as it corresponds with major developmental changes and the acceptance of personal health responsibility. Many times, lacking the required knowledge to independently control their health, teenagers caused disruptions in therapy and other areas of care.

The identification of the present interventions used by healthcare professionals in handling the group of patients constitutes the third goal of the review. Six thematic intervention approaches were found: youth-friendly health services, voluntary testing campaigns, peer education, psychological support, structured disclosure, and integrated sexual and reproductive health-HIV services. Treatment utilisation and compliance were shown to be higher in youth-friendly health services (YFHS) that were designed to be easily available, discreet, and sensitive to the unique needs of young people. Secondly, Voluntary counselling and testing (VCT) settings that gave priority, comfort and secrecy were also facoured (Anaba et al., 2022; Asare et al., 2020). In these settings, treatment now mostly consists on psychological support including mental health services and peer therapy. Especially when included into regular HIV therapy, Agyemang et al. (2020) underlined that these interventions improved self-esteem and lessened emotional distress.

One more crucial intervention was effective disclosure techniques. Results from the review indicated that healthcare professionals and carers used approach along empathy and structured communication to encourage the young people living with HIV to become more responsibility for their health (Appiah et al., 2019; Gyamfi et al., 2015). Evidence from these studies showed that empathetic disclosure improved adherence to ART and raised confidence among the young people. Another intervention is a formalised and organised transition programmes that help youngsters go from paediatric to adult treatment also fall under other approaches. Agambire et al. (2022) opined that tailored follow-up, mentoring, and integrated care planning helped to smooth transitions and lower loss to follow-up. Community-level initiatives include awareness campaigns and outreach aimed at teenagers proved successful in reducing stigma and improving knowledge about HIV prevention and treatment (Dako-Gyeke et al., 2020; Nwaozuru et al., 2022). Particularly within school environments, comprehensive sexual education was strongly supported. Emphasising early education on HIV prevention, safe sex, and gender dynamics is essential for empowering young people to make informed decisions, (Tetteh et al., 2024). Digital and mobile health solutions have been identified as possible ways that improve adherence, offer appointment reminders, and enable remote counselling even if they are not being used much (Nichols et al., 2019).

While stressing crucial national features, the results of this systematic study on HIV prevalence among teenagers and young adults in Ghana greatly improve the global debate on youthful HIV epidemic. Examined within the larger regional and worldwide frameworks, Ghana's HIV environment exposes both common trends and unique challenges that demand thought in public health planning and intervention activities. The combination of clinic-based and population-level data in the review offers a more advanced understanding than previous studies usually evaluating both data sources alone. With the clinic-based study in Ghana showing a 100% prevalence among teenagers living with HIV (ALHIV), the global prevalence of HIV in important adolescent groups is clear across many settings. This finding aligns with data from high-burden regions such Southern and Eastern Africa, where specialist HIV clinics similarly show virtually universal incidence among their teenage patients (Maskew et al., 2019; Mecha et al., 2018).

Still, nationally representative data suggest that Ghana's general population prevalence of 1.5% among those between the ages of 15 and 49 significantly differs with the 7.1% average prevalence seen in this study. This difference emphasises that the pandemic in Ghana is localised rather than widespread, which has important implications for the relative merits of targeted and universal intervention approaches.

This review approach deliberately combines clinic-based and population-derived prevalence data, therefore transcending previous synthesis. Previous studies mostly focused on single data sources; yet, this concurrent analysis revealed that clinic samples greatly distort the prevalence rates in the broader community while also providing important information on the clinical situation of ALHIV. This dual approach is especially beneficial for Ghana and comparable mid-prevalence nations, where the epidemic's concentration necessitates comprehension of both general population trends and the acute needs of impacted subgroups.

4.1 Implications of the Study

The results of this meta-analysis and systematic review on juvenile and adolescent HIV in Ghana would influence future studies as well as policies and programs in this area. The estimated pooled HIV prevalence of 7.1% among teenagers and young people far exceeds the national adult prevalence of 1.7% (Opoku et al., 2022), therefore underscoring a hidden epidemic inside this group that requires concentrated action. Particularly for teenagers moving from paediatric to adult HIV treatments, this increased prevalence points to gaps in early diagnosis, prophylaxis, and continuity of treatment. The notable differences noted the in studies can be traced to the impact of geographical, sociodemographic, and healthcare access differences, hence policy development must adopt this path and recommend therapies which are tailored to fit the particular needs of different adolescent groups. While rural areas might benefit more from mobile outreach programs and community-driven educational campaigns, urban centres may need policies addressing dangerous sexual behaviours and stigma inside school institutions. This emphasises the need of distributed, young-centric care approaches as well as the explosion of adolescent-friendly medical facilities all throughout the country.

Furthermore, the theme results from qualitative investigations indicated ongoing psychosocial obstacles encountered by teenagers with HIV, such as stigma, difficulty in disclosure, diminished self-esteem, and inadequate adherence to antiretroviral medication. These findings encourage the enhanced incorporation of mental health and psychosocial assistance into HIV programs for adolescents. This review's evidence also endorses the expansion of peer-led initiatives, youth clubs, and family-centered disclosure practices, which have demonstrated potential in enhancing outcomes for teenagers. The study stresses the pressing necessity for extensive sexuality education and enhanced availability of volunteer HIV counselling and testing services, especially for both in-school and out-of-school adolescents. Future research should concentrate on the long-term results of interventions and the efficacy of diverse service delivery strategies in enhancing engagement and retention of adolescents across the HIV treatment continuum.

4.2 Limitations of the Study

This systematic review and meta-analysis, although thorough, has some drawbacks. Initially, while the review complied with PRISMA recommendations and employed stringent quality assessment utilising Joanna Briggs Institute (JBI) methodologies, discrepancies in research design, locations, and populations resulted in considerable variability that might have affected the aggregated estimates. Variations in age group classifications, urban-rural representation, and clinic-based vs population-based sampling complicate direct comparisons among researches. Furthermore, several included research depended on self-reported HIV status or behaviours, which are susceptible to memory and social desirability biases. This may have resulted in an underestimation or overestimation of prevalence or behavioural effects. The cross-sectional design of several research restricts the capacity to deduce causation, especially for the effects of treatments. Moreover, data about gender differences, critical populations, and geographical inequalities were not uniformly disaggregated, hence constraining the comprehensiveness of subgroup analysis. Finally, while the meta-analysis used strict statistical techniques, the small number of studies recording HIV prevalence among adolescents hindered the accuracy of the aggregated estimate and reduced the possibility for thorough subgroup analyses.

V. CONCLUSIONS

The review provides a thorough outlook of HIV prevalence, impact, and adopted interventions deployed for Ghanian adolescent and young adults. With an incidence rate of 7.1%, the study concludes that the prevalence of HIV among this category far exceeds the national rate. The study further noted that psychological, behavioural, and structural obstacles indicate the need of age-appropriate stigma-sensitive, integrated HIV interventions. To reduce the HIV load in this cohort, focused interventions like youth-friendly services, improved access to testing, family disclosure support, and peer-led education are very vital. Tracking trends, evaluating treatments, and guiding evidence-based policy in Ghana's HIV response will depend on improving monitoring systems and funding longitudinal, mixed-methods research.

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