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Vision and Vulnerability: A Critical Review of Ocular Challenges and Their Implication on Adolescent Reproductive Health

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Abstract

Adolescents with visual impairments face significant yet underexplored barriers to accessing sexual and reproductive health (SRH) services and information. This review examines how ocular challenges influence SRH outcomes, particularly in low- and middle-income countries. Causes of visual impairment, such as refractive errors, cataract, infections, glaucoma, trauma, and congenital conditions, can reduce independence, affect relationship, heighten vulnerability to abuse, and complicate menstrual hygiene management. Limited accessibility of SRH content, stigma, and poor digital inclusivity further deepen these disparities. Innovative responses include inclusive SRH education in Braille and audio formats, peer-led models, assistive technologies, and cross-sectoral collaborations across health, education, and social services. However, major gaps remain in disability-disaggregated data and SRH research for adolescents with ocular disabilities. A rights-based, intersectional approach, guided by the Convention on the Rights of Persons with Disabilities (CRPD), is vital to ensure visually impaired adolescents are not left behind in SRH progress.

Keywords:

Visual impairment, Vulnerability, Adolescents, Reproductive Health

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Introduction

Adolescence is a critical phase of human development marked by rapid physical, emotional, and psychosocial changes that shape future health and well-being. Defined by the World Health Organization (WHO) as the period between 10 and 19 years, adolescence is characterized by increased autonomy, identity formation, and the onset of reproductive capability[1]. Reproductive health, encompassing a state of complete physical, mental, and social well-being in all matters relating to the reproductive system, is essential for ensuring that adolescents transition into adulthood with the knowledge, agency, and support needed to make informed decisions[2]. However, various public health challenges threaten this goal, with visual impairment emerging as a silent but significant barrier[3].

Globally, an estimated 2.2 billion people experience some form of vision impairment, with children and adolescents comprising a significant portion[4,5]. According to the International Agency for the *Prevention* of Blindness (IAPB, 2021), approximately 19 million children and adolescents under the age of 15 are visually impaired, with refractive errors, cataracts, congenital anomalies, infections, and trauma being the most common causes[6]. In low- and middle-income countries (LMICs), including parts of sub-Saharan Africa, limited access to eye care services and early detection further compounds this burden.

Studies from Nigeria report a prevalence of uncorrected refractive errors ranging from 5% to 50% among school-aged youth, underscoring the unmet need for inclusive eye health services [7]. In sub-Saharan Africa, the prevalence of visual impairment among adolescents ranges from 2.2-% to 34.6%, depending on population, setting, and assessment method[8]. In Nigeria, studies have shown that refractive errors account for about 35% of visual impairment among school-aged children and adolescents[7,9]. Urban-rural disparities also exist, with urban adolescents often facing a higher prevalence due to screen-related eye strain, while rural youth may be more affected by infections and trauma-related conditions[10].

Despite its prevalence, vision impairment among adolescents remains underexplored in the context of sexual and reproductive health (SRH)[8]. This review critically examines the intersection between ocular challenges and adolescent sexual and reproductive health, exploring how vision impairment influences access, equity, and outcomes in SRH. It aims to synthesize existing literature, identify gaps in research and policy, and highlight best practices and interventions that promote inclusion. By drawing attention to an often-overlooked dimension of adolescent health[11], this review advocates for disability-sensitive, rights-based approaches in adolescent reproductive health programming.

Methodology of the Review

This review employed a structured narrative synthesis approach to examine existing literature on ocular challenges and their implications for adolescent reproductive health. A comprehensive search was conducted across three major academic databases: PubMed, Scopus, and Web of Science. The search covered peer-reviewed articles published between 1992 and 2025 using keywords such as “adolescents,” “visual impairment,” “ocular health,” “reproductive health,” “sexual health,” “disability,” and “access to healthcare.”

Inclusion criteria were studies focusing on adolescents (ages 10–19), addressing either visual impairments or reproductive health outcomes, and those discussing barriers or interventions related to disability in healthcare access. Both quantitative and qualitative studies, as well as relevant reviews and policy documents, were included. Exclusion criteria were studies unrelated to adolescence or reproductive health, studies solely focused on adults or elderly populations, and non-English publications. Data were synthesized thematically, highlighting patterns, emerging gaps, and policy-relevant insights.

Causes and Health Determinants of Visual Impairment in Adolescents

Uncorrected refractive errors- myopia, hyperopia, and astigmatism- are the leading causes of visual impairment in adolescents globally[12]. Myopia, in particular, is reaching epidemic proportions, with projections estimating that by 2050, half of the world’s population will be myopic[13]. Adolescents engaged in intensive near-work tasks such as reading and screen use are especially susceptible. In many LMICs, the lack of access to affordable corrective lenses further exacerbates this challenge. Ocular infections such as conjunctivitis, trachoma, and onchocerciasis remain prevalent in some regions, especially in rural Africa[14]. Poor sanitation, crowded living conditions, and lack of awareness contribute to the spread of

infectious eye diseases in adolescents. For instance, Nigeria remains one of the countries endemic for onchocerciasis, which, while primarily affecting adults, has also been documented among adolescents in endemic communities[15].

Ocular trauma is a significant yet underreported cause of adolescent vision loss[16]. Adolescents may experience eye injuries through road traffic accidents (RTAs), particularly as passengers on motorcycles or commercial vehicles without proper protection[17]. Social pressures and gender norms also contribute to eye trauma[17]. The use of harmful cosmetic products or coloured contact lenses without medical supervision, especially among adolescent girls seeking social acceptance, has been linked to corneal injuries and infections[18]. An institution-based anecdotal report described the case of a 19-year-old girl who sustained an accidental eye injury from a needle prick while having her hair braided; the injury led to corneal perforation and subsequent development of a complicated cataract, resulting in permanent visual loss despite surgical intervention (figure 1); this case highlights the risks associated with fashion trends in adolescents.

In addition, gender-based violence, including slaps, punches, and acid attacks, disproportionately affects adolescent girls and may lead to long-term ocular damage[19]. Congenital causes of visual impairment, such as congenital cataracts, glaucoma, and retinopathies, often go undetected in early childhood and become more apparent during adolescence. In resource-limited settings, delayed diagnosis and lack of access to paediatric ophthalmology services result in irreversible damage by the time care is sought. Systemic diseases like diabetes, sickle cell disease, and juvenile rheumatoid arthritis can also affect ocular health. For example, diabetic retinopathy and sickle cell retinopathy, though less common in early adolescence, may begin to manifest in older teenagers. In sub-Saharan Africa, sickle cell disease is highly prevalent and presents risks of retinal vascular changes and haemorrhage[20].

The determinants of adolescent ocular health include social, economic, and structural factors[21]. Poverty, gender norms, cultural practices, and limited health literacy often restrict timely access to eye care. In many communities, eye problems are not prioritized until they cause visible disability or complete blindness. Adolescent girls, in particular, may face barriers due to sociocultural norms that deprioritize their health needs or restrict mobility[22]. Health systems in LMICs are frequently under-resourced and fragmented, with minimal investment in school eye health programs, community screening, or disability-inclusive services. Vision screening is rarely part of routine adolescent health checks, and few health workers are trained to detect early ocular issues in youth. In some cases, adolescents may avoid seeking help due to stigma associated with wearing glasses or being labeled as "disabled," further perpetuating untreated impairment[23,24]. Furthermore, the integration of eye health with broader adolescent sexual and reproductive health (SRH) services is almost non-existent. While eye conditions may not directly affect the reproductive system, their indirect consequences-such as reduced self-esteem, social withdrawal, and vulnerability to abuse- can significantly impair adolescents' ability to engage in safe, informed reproductive health decisions.

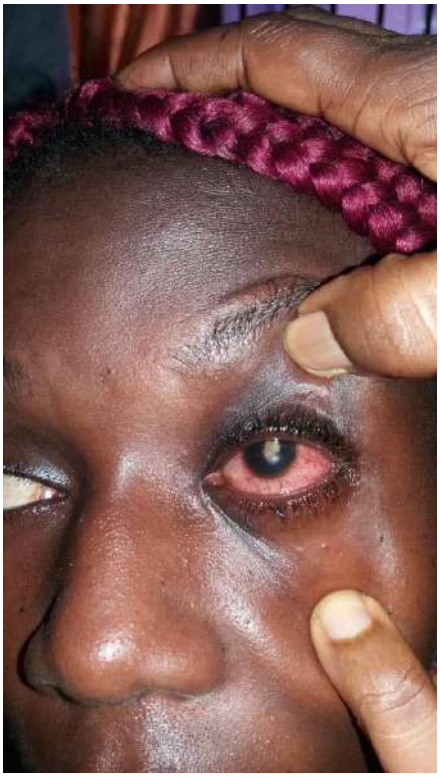

Figure 1: An institution-based anecdotal report describing the case of a 19-year-old girl who sustained an accidental eye injury from a needle prick while having her hair braided. The injury led to cornea perforation and complicated cataract.

The Intersection of Visual Impairment and Adolescent Reproductive Health

Adolescents with visual impairments face unique and often overlooked barriers in accessing comprehensive sexual and reproductive health (SRH) services[24]. These barriers are not only biomedical but also deeply rooted in social, cultural, and systemic structures that marginalize adolescents with disabilities. The intersection of visual impairment and adolescent reproductive health thus demands critical attention to ensure inclusive, rights-based care and information delivery. Accessing SRH information is a fundamental human right. However, adolescents with visual impairments frequently encounter challenges in obtaining age-appropriate, accessible information due to the lack of disability-inclusive SRH content[25]. Traditional health promotion relies heavily on printed materials, charts, or visuals-media that are inaccessible to those with limited or no vision unless adapted into Braille or audio formats, which are scarcely available in most low- and middle-income countries[26]. Digital health innovations, such as mobile apps and e-health platforms, have the potential to bridge information gaps but often lack features that accommodate screen readers or voice-command interfaces for the visually impaired[27]. As a result, visually impaired adolescents remain underserved by mainstream SRH campaigns, increasing their vulnerability to misinformation and risky behaviors.

Visually impaired adolescents are at heightened risk of sexual abuse, coercion, and exploitation due to their perceived vulnerability and lack of independence; studies have

shown that adolescents with disabilities are up to four times more likely to experience sexual violence compared to their peers without disabilities[28]. This is further compounded by communication barriers that hinder disclosure and reporting of abuse, as well as societal tendencies to dismiss the sexuality and agency of persons with disabilities. Inability to visually interpret warning cues or body language can compromise a visually impaired adolescent's ability to assess and respond to unsafe situations. In many cases, they are also heavily dependent on caregivers or peers, reducing their privacy and independence in navigating SRH matters. This dependence can create exploitative dynamics, where help may be conditional or manipulative.

Menstrual hygiene management is particularly challenging for visually impaired girls; the inability to visually monitor blood flow, clean themselves properly, or discreetly dispose of sanitary materials increases the risk of infections, embarrassment, and absenteeism from school[29]. In resource-limited settings, these challenges are intensified by the lack of adapted menstrual products or caregiver support, leading to poor self-esteem and social withdrawal. Moreover, many visually impaired girls report a loss of privacy during menstruation, as they depend on others for assistance, which compromises their dignity and reproductive rights.

The dual stigma of disability and reproductive health concerns can severely undermine an adolescent's mental health[25]. Adolescents with visual impairments may already struggle with body image issues and low self-esteem, and when coupled with SRH-related stigma-such as menstruation, contraceptive use, or perceived sexual inexperience or promiscuity, psychosocial burden intensifies. In many cultures, the early use of corrective eyewear like glasses is stigmatized, particularly among adolescent girls, who may be teased or labelled as "nerdy" or unattractive[23]. This can discourage early treatment of refractive errors and reduce participation in health programs. These cumulative stigmas not only affect mental health but also create long-term barriers to accessing care, fostering feelings of shame and social exclusion.

Prevention: Innovations, Interventions, and Best Practices in Addressing the SRH Needs of Visually Impaired Adolescents

Ensuring equitable access to sexual and reproductive health (SRH) services for adolescents with visual impairments requires a multi-faceted, inclusive, and rights-based approach[30]. Preventive strategies that incorporate education, technology, and systemic collaboration are crucial in bridging the information and service gaps faced by this vulnerable population. Inclusive SRH education is foundational for empowering visually impaired adolescents to make informed reproductive choices[31]. Traditional SRH curricula often neglect accessibility, excluding those who rely on non-visual formats[32]. Adaptations such as Braille-printed educational materials, audio resources, and tactile models have proven effective in increasing comprehension and confidence among blind adolescents. Integrating sign-language-assisted instruction also benefits those with dual sensory impairments.

Additionally, comprehensive sexuality education should include disability-sensitive content that dispels myths about the sexuality of persons with disabilities, helping both

educators and learners to foster respect, inclusion, and dignity (WHO, 2021). Peer-led education and community-based outreach programs are valuable in engaging visually impaired adolescents in safe, supportive spaces. These models, particularly when led by individuals with disabilities, enhance trust, relevance, and relatability. For example, the "Youth with Disabilities for Rights and Health" project in sub-Saharan Africa demonstrated increased SRH knowledge and assertiveness among participants through peer-led approaches[33]. Community-based programs also enable culturally appropriate interventions and help reduce stigma by promoting inclusive social norms around disability and adolescent sexuality.

Assistive technologies and telehealth platforms offer scalable and cost-effective solutions for SRH service delivery[34]. Screen readers, voice-command apps, Braille displays, and audio-based SRH chatbots provide privacy and autonomy in information access[35]. With the expansion of mobile phone use in low-resource settings, these tools can be harnessed to reach visually impaired adolescents where they are. Telehealth services, when adapted for accessibility, also offer confidential consultation and counseling, crucial for adolescents navigating sensitive SRH issues. However, these tools must be co-designed with users to ensure functionality and relevance. Effective SRH service delivery for visually impaired adolescents necessitates collaboration across health, education, and social services. Cross-sectoral efforts help harmonize policies, improve data collection on disability and SRH outcomes, and ensure continuity of care. For instance, integration of SRH education into inclusive school curricula, supported by health providers and social workers, reinforces consistent messaging and support systems[36]. Moreover, such collaboration strengthens referral pathways and facilitates early identification of abuse, access to menstrual hygiene products, and psychosocial support. At the core of all interventions must be a commitment to upholding the reproductive rights of adolescents with visual impairments. This includes respecting their autonomy, dignity, and right to access SRH services without discrimination or coercion. Healthcare providers must be trained to obtain informed consent in accessible formats and provide services that honor the evolving capacities of adolescents. Safeguarding policies should be strengthened to prevent abuse and ensure secure reporting channels for victims.

These measures align with international frameworks such as the Convention on the Rights of Persons with Disabilities (CRPD) and the International Conference on Population and Development (ICPD), which advocate for the inclusion, protection, and empowerment of persons with disabilities in all matters of SRH[37].

Research Gaps and Future Directions

Despite growing global commitment to inclusive health, significant research gaps persist at the intersection of adolescent reproductive health and visual impairment[38,39]. One of the foremost challenges is the limited integration of disability-focused sexual and reproductive health (SRH) services within mainstream health programs. Many adolescent health initiatives-both at national and subnational levels-fail to include tailored strategies for

persons with disabilities, thereby marginalizing those with visual impairments from SRH interventions and education[40].

A major contributor to this exclusion is the poor disaggregation of health data by disability status. Global and regional adolescent health surveys, such as the Demographic and Health Surveys (DHS), rarely include visual impairment-specific data, making it difficult to track disparities or design responsive programs. Without consistent data disaggregation, the scale and nature of SRH challenges faced by visually impaired adolescents remain underreported and poorly understood. There is also a stark lack of studies focusing specifically on SRH outcomes among adolescents with ocular disabilities. While broader disability-inclusive research exists, vision-related impairments are often aggregated under general disability categories, masking their unique implications on reproductive autonomy, access to information, and exposure to abuse.

Case studies from low- and middle-income countries (LMICs) like Uganda and Bangladesh have demonstrated some progress in inclusive SRH programming through community-based models, but these often lack scalability and robust evaluation mechanisms[41]. In contrast, high-income countries (HICs) such as Sweden and Canada have incorporated more comprehensive disability-inclusive policies; however, even these settings report inadequate training of SRH service providers in managing the unique needs of adolescents with visual impairments[42]. There is an urgent need for the development and implementation of disability-sensitive SRH indicators. These indicators should capture access to services, consent and autonomy, experiences of gender-based violence, menstrual hygiene management, and SRH knowledge, disaggregated by type and degree of disability. Such tools will enhance monitoring and evaluation systems, enabling policymakers and practitioners to respond more effectively to the needs of visually impaired adolescents. Future research should prioritize interdisciplinary collaborations that engage ophthalmologists, public health experts, educators, social scientists, and youth with disabilities themselves. Priority areas include: exploring the impact of visual impairment on SRH decision-making; evaluating the effectiveness of accessible digital SRH tools; and investigating the psychosocial impact of dual stigma (disability and SRH-related).

Conclusion

Adolescents with visual impairments remain an underserved and often overlooked group in sexual and reproductive health (SRH) programming, despite their unique vulnerabilities and rights. This review has highlighted the intersectional challenges faced by visually impaired adolescents, including restricted access to SRH information, heightened risk of abuse, challenges in menstrual health management, and the dual burden of stigma. While global discourse around disability inclusion is gaining momentum, substantial gaps persist in service delivery, policy implementation, and research.

There is an urgent need to adopt inclusive, rights-based approaches that prioritize accessibility, equity, and dignity. Innovations such as assistive technologies, inclusive SRH education formats, peer-led interventions, and multi-sector collaborations offer promising pathways for improving outcomes. However, without robust data disaggregation, disability-

sensitive indicators, and targeted research, particularly in low-resource settings, many adolescents will continue to be excluded from essential SRH services. To advance health equity, policymakers, healthcare providers, educators, and researchers must work collaboratively to center the experiences and needs of visually impaired adolescents in program design and evaluation. Upholding their sexual and reproductive rights is not only a legal and ethical imperative but also a critical step toward realizing inclusive public health systems and achieving global development goals.

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