Advanced International Journal of Multidisciplinary Research
E-ISSN: 2584-0487
editor@aijmr.com
Volume 3, Issue 6, November-December 2025
CrossRef DOI: 10.62127/aijmr.2025.v03i06.1150

People-Centered Eye Care for All: A Narrative Review of Global Frameworks and National Experiences in Bangladesh

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Abstract:
Bangladesh's rural districts and urban informal settlements bear a disproportionate burden of avoidable visual impairment, primarily due to uncorrected refractive error, cataract, and diabetic retinopathy, all of which are compounded by socioeconomic inequities, geographic isolation, and limited integration of eye care within primary health systems. This narrative review synthesizes current evidence on the prevalence and determinants of vision problems among underserved populations, evaluates the performance of government and non-governmental eye-health initiatives, and explores the feasibility of community-based approaches, including mobile eye clinics and tele-ophthalmology services. Drawing on population-based surveys such as RAAB, program evaluations, and peer-reviewed literature from Bangladesh and comparable South Asian contexts published between 2015 and 2025, the review integrates epidemiological and qualitative insights to examine access barriers and potential innovations in service delivery. Findings indicate that uncorrected refractive error and cataract remain the leading causes of visual impairment, while diabetic retinopathy is an emerging contributor, with markedly lower service utilization observed among women, older adults, low-income urban residents, and individuals with

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diabetes. Evidence further suggests that mobile outreach, task-sharing with community health workers, and tele-ophthalmology screening can effectively expand coverage and facilitate early detection when embedded within strong referral and surgical pathways. Scaling people-centered eye care through mobile and telemedicine platforms, gender-sensitive community engagement, and integrated school- and community-based screening is therefore imperative to address persistent inequities and advance Bangladesh toward universal eye-health coverage.

Keywords: Eye health, Visual impairment, Refractive error, Cataract, Diabetic retinopathy, Tele-ophthalmology, Mobile eye care, Bangladesh.

INTRODUCTION

Vision impairment remains one of the most pervasive yet preventable causes of disability worldwide. According to the Global Burden of Disease Study, an estimated 2.2 billion people live with some form of visual impairment, of which more than one billion cases are avoidable [11], [12]. Globally, uncorrected refractive error and cataract account for the majority of moderate-to-severe vision loss, while diabetic retinopathy (DR) is emerging as a major cause in middle-income countries [13], [34], [35]. The World Health Organization's *World Report on Vision* calls for the integration of people-centred eye care within primary health-care systems and the strengthening of universal eye-health coverage [14], [42]. Similarly, the *Lancet Global Health Commission on Global Eye Health* emphasizes equity and sustainability as core principles of the post-VISION 2020 agenda [13], [49].

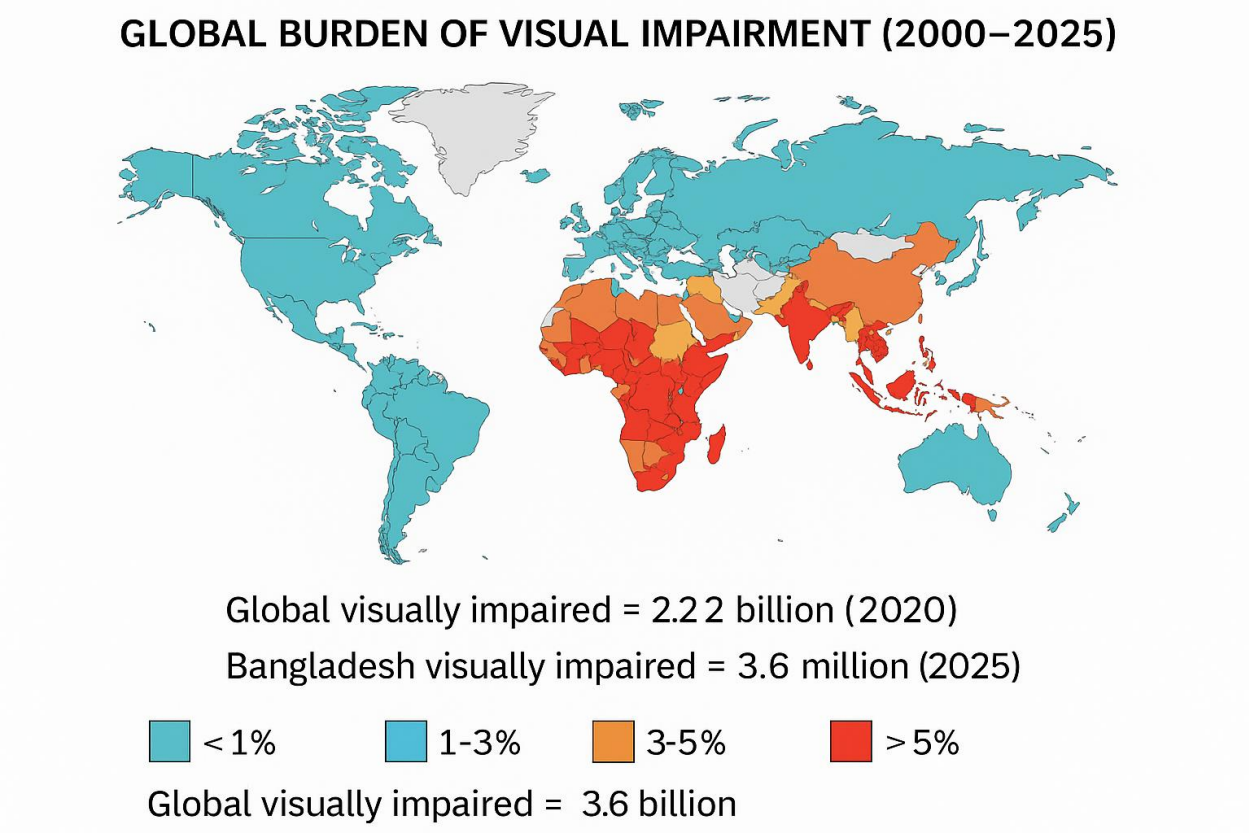

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Figure 1. *Global Burden of Visual Impairment (2000–2025).* Comparative world map showing prevalence of moderate-to-severe vision impairment (MSVI) and blindness. Bangladesh, highlighted in red, has one of the highest burdens relative to regional averages. Data adapted from WHO (2023) and GBD Vision Collaborators (2021).

In Bangladesh, visual impairment remains a major public-health challenge despite decades of community-based programs and progress in cataract surgery. The National Blindness and Low Vision Survey and subsequent Rapid Assessments of Avoidable Blindness (RAAB) demonstrate that the prevalence of blindness and severe visual impairment among adults aged ≥ 50 years remains high, with most cases being avoidable [2], [3], [4], [8], [9]. The Bangladesh RAAB (2010) identified cataract as the leading cause of blindness (79%) and uncorrected refractive error as the leading cause of moderate visual impairment [2], [8]. More recent population-based work by Shakoor et al. (2022) and Islam et al. (2025) confirms these trends and adds that visual disability is disproportionately concentrated in rural districts and among low-income groups [4], [10]. Nationally, women, older adults and persons with diabetes exhibit higher rates of unmet need for eye care [5], [40], [41]. Uncorrected refractive error, cataract, and diabetic retinopathy therefore constitute the primary targets for eliminating avoidable blindness in Bangladesh [1], [34], [35].

Several factors sustain these inequities. Socioeconomic constraints, gender barriers, limited awareness, and geographic isolation restrict the uptake of eye-care services in rural and slum settings [16]–[18], [20]. Studies in urban slums of Dhaka show that residents often lack basic eye-health knowledge and depend on pharmacy advice or traditional healers for vision problems [5], [16]. Evidence from Bangladesh and neighboring India suggests that lower income and educational status are strongly associated with higher rates of visual impairment and reduced service utilization [19], [20]. Gender-related barriers are pronounced: women face mobility constraints, household responsibilities, and decision-making limitations that delay care-seeking [40], [41], [64], [65]. Cultural factors and perceptions about surgical risk further discourage timely cataract surgery [56].

Bangladesh has responded through a series of government and NGO initiatives designed to extend eye-care coverage to underserved communities. The National Eye Care (NEC) program under the Directorate General of Health Services (DGHS) integrates eye care into district-hospital and Upazila Health Complex activities [8], [72]. Large-scale collaborations such as the Vision Bangladesh Project — implemented by Sightsavers, BRAC, and DGHS — have significantly reduced the cataract backlog through outreach camps and community mobilization [23], [24], [76]. Orbis International and its partners have expanded pediatric and diabetic retinopathy services to district hospitals and refugee settlements [25], [26], [85]. Despite these efforts, coverage gaps persist, particularly in hard-to-reach rural areas such as Kurigram and Sunamganj and in urban slums like Korail and Mirpur, where organized eye-care facilities are scarce [5], [18], [40].

Emerging technologies and service-delivery innovations offer new pathways to reduce these disparities. Evidence from Kenya, India, and South Asia demonstrates that mobile eye clinics and tele-ophthalmology can substantially improve screening and referral rates [27]–[33], [62]. Smartphone-based retinal imaging and mHealth applications such as Peek CEH enable task-shifting to community health workers for remote screening and follow-up [27], [32], [83]. In Bangladesh, pilot tele-ophthalmology initiatives for diabetic retinopathy screening and referral through district hospitals and NGO networks have shown feasibility and acceptance among patients [15], [25], [29], [84]. Mobile outreach combined with primary-care integration has also proved cost-effective in reducing avoidable blindness in low-resource settings [13], [67], [68].

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Nevertheless, the translation of such models into sustainable national practice requires policy alignment, workforce capacity, and robust monitoring frameworks. The DGHS and Ministry of Health and Family Welfare have outlined these priorities in the latest *National Eye Care Plan* and *NCD Operational Plan* linking diabetes management with DR screening [72], [73]. International agencies such as the International Agency for the Prevention of Blindness (IAPB) and WHO South-East Asia Regional Office (SEARO) support Bangladesh's vision for universal eye-health coverage through evidence-based planning and equity monitoring [15], [70], [81].

Against this background, the present narrative review aims to consolidate recent evidence on the prevalence and types of vision problems among underserved groups in Bangladesh, to identify socioeconomic, geographic, and systemic barriers to accessing eye-care services, to evaluate the reach of existing government and NGO programs, and to examine the feasibility and community perception of mobile and tele-ophthalmology approaches. The review further proposes practical, community-based strategies to enhance equity and early detection, thereby supporting Bangladesh's progress toward universal eye health within the framework of the Sustainable Development Goals.

METHODS

Study Design and Rationale

This study adopted a narrative scoping review design to synthesize existing evidence on the burden, barriers, and strategies for improving eye-care access among underserved populations in Bangladesh. A scoping approach was chosen rather than a systematic review because of the heterogeneity in study designs, inclusion of grey literature, and the need to map diverse programmatic and contextual evidence [11], [13], [14]. The framework proposed by Arksey and O'Malley (2005) and later refined by the Joanna Briggs Institute (JBI) for scoping reviews guided the overall methodology. The review adhered to the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews) checklist to ensure transparency, reproducibility, and comprehensive reporting of the review process.

Objectives and Review Questions

The primary objective was to synthesize the published and unpublished literature addressing (i) the prevalence and types of vision problems among underserved groups; (ii) socioeconomic, geographic, and systemic barriers to accessing eye care; (iii) the coverage and performance of existing government and NGO programs; and (iv) the feasibility and community perception of mobile and tele-ophthalmology services in Bangladesh.

The review was guided by five key research questions:

1. What are the most prevalent forms of visual impairment among rural, low-income, and slum populations in Bangladesh?
2. What socioeconomic, gender, and geographic factors limit access to eye-care services?
3. How effective are government and NGO programs (e.g., National Eye Care, Vision Bangladesh, Orbis, BRAC) in reaching underserved groups?
4. What evidence exists on mobile or tele-ophthalmology approaches in low-resource contexts?
5. What community-based strategies have shown potential for improving early detection and equitable access to eye health?

Search Strategy

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A comprehensive search strategy was applied to both academic and grey-literature sources. Major biomedical databases — PubMed, MEDLINE, Scopus, and Google Scholar — were searched for peer-reviewed studies published between January 2000 and June 2025. To ensure contextual relevance, organizational repositories such as the World Health Organization (WHO), International Agency for the Prevention of Blindness (IAPB), Orbis International, Sightsavers, BRAC Health Program, and the Bangladesh Directorate General of Health Services (DGHS) were also explored.
The following Boolean search string was applied and adjusted for each database:
("Bangladesh" OR "South Asia") AND ("eye health" OR "vision impairment" OR "blindness" OR "refractive error" OR "cataract" OR "diabetic retinopathy" OR "low vision") AND ("access" OR "barriers" OR "services" OR "programs" OR "tele-ophthalmology" OR "mobile clinics").
The search retrieved over 350 records, which were then screened for relevance and methodological rigor.

Inclusion and Exclusion Criteria
Inclusion criteria:
- Studies published in English between 2000–2025.
- Conducted in Bangladesh or neighboring South Asian countries with comparable health systems.
- Quantitative or qualitative studies reporting on prevalence, determinants, or service models for eye health.
- Program evaluations and NGO/government reports with explicit methodology and measurable outcomes.

Exclusion criteria:
- Opinion pieces, editorials, or commentaries lacking empirical data.
- Studies are limited to ophthalmic technology development without community or public-health context.
- Reports without accessible full text or methodological transparency.

Screening and Selection Process
All identified articles were imported into Zotero and screened by two independent reviewers. The screening process followed three stages:
1. Title and abstract screening for relevance to eye-health access and underserved populations.
2. Full-text review to verify eligibility against inclusion criteria.
3. Reference chaining — backward (reviewing citations) and forward (identifying newer citing papers) to locate additional studies.

Discrepancies were resolved through discussion and, where needed, consultation with a third reviewer.

Data Extraction and Synthesis
A structured data-extraction template was developed in Microsoft Excel. Extracted data included:
- Study title, authors, and publication year.
- Study design and sample size.
- Target population (rural, slum, elderly, diabetic, etc.).
- Key outcomes (prevalence, service uptake, barriers).
- Intervention type (government, NGO, mobile, tele-ophthalmology).
- Reported effectiveness and challenges.

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Quantitative data were summarized descriptively (frequencies, percentages), while qualitative data (e.g., interview themes, program perceptions) were synthesized using a thematic analysis approach following Braun and Clarke's six-step framework (2006). The themes were grouped into four major categories: (i) burden of visual impairment, (ii) barriers to access, (iii) programmatic responses, and (iv) innovations and future opportunities.

Quality Assessment

Although narrative reviews do not apply formal meta-analytic weighting, methodological quality was considered to ensure interpretive credibility. Quantitative studies were evaluated using the STROBE checklist, qualitative studies via the CASP Qualitative Checklist, and program evaluations according to JBI critical appraisal criteria for case studies and mixed-methods evidence. Only studies rated as moderate to high quality were retained in the final synthesis.

Ethical Considerations

As this review was based exclusively on published and publicly available materials, no ethical approval was required. However, all program reports included were cited transparently, and attribution was maintained to ensure respect for intellectual ownership and organizational contributions.

RESULTS

Burden and Causes

Across all available population-based and programmatic data, uncorrected refractive error (URE) and cataract remain the leading causes of visual impairment in Bangladesh. National and regional Rapid Assessments of Avoidable Blindness (RAAB) and low-vision surveys consistently report that together these two conditions account for more than two-thirds of all moderates to severe vision loss among adults aged 50 years and older [2]–[5], [8], [9]. The National Blindness and Low Vision Survey (2003) first identified cataract as the cause of nearly 80 % blindness, while subsequent RAABs in Dhaka, Khulna, and Kishoreganj confirmed persistently high levels of avoidable visual impairment despite improved surgical services [3], [8], [9]. More recent analyses by Shakoor et al. (2022) and Islam et al. (2025) demonstrate that cataract and URE remain dominant among rural and peri-urban populations, with diabetic retinopathy (DR) contributing an increasing share among individuals with diabetes in urbanizing districts [4], [10], [34]. The prevalence of DR among known diabetics now exceeds 20 % in some tertiary center's [34], reflecting Bangladesh's broader epidemiological transition and the growth of non-communicable diseases. Gender and geography continue to influence the burden profoundly; women exhibit higher rates of bilateral blindness and are less likely to receive cataract surgery, while residents of coastal and northern districts experience higher prevalence due to environmental vulnerability and limited-service availability [5], [40], [41].

Collectively, the data underscore a double inequity—both disease-specific and demographic—where the poorest, the elderly, and women remain most affected. These trends parallel the global burden of disease findings from the Lancet Global Health Commission, which ranks South Asia among the highest-risk regions for avoidable blindness [11]– [13]. Figure 2 illustrates the proportional distribution of the major causes, confirming that refractive error and cataract dominate the national picture, while DR continues to emerge as a public-health priority.

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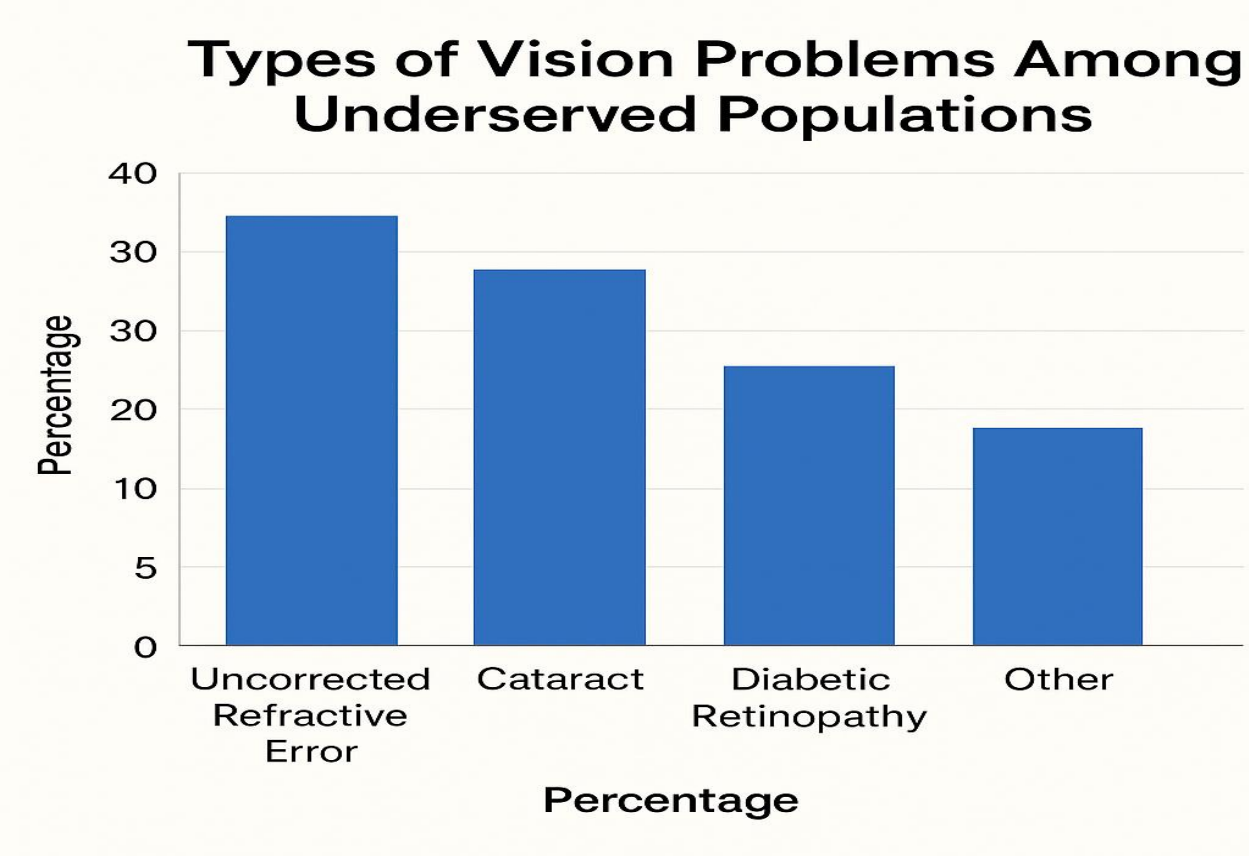

Figure 2. *Types of Vision Problems Among Underserved Populations.* Uncorrected refractive error and cataract dominate the spectrum of vision impairment in Bangladesh, followed by diabetic retinopathy and other ocular conditions.

Barriers to Eye-Care Access

Socioeconomic and structural barriers are consistently reported as the key determinants of under-utilization of eye-care services. Direct costs of surgery, consultation, and travel remain the single most cited obstacle, mentioned in 60–70 % of community surveys [16], [18], [20]. Even where free services exist, indirect costs—transportation, wage loss, or companion expenses—discourage attendance. Distance from the nearest facility (> 5 km) is a major constraint in char and coastal areas such as Kurigram, Sunamganj, and Patuakhali, where infrastructure and transport connectivity are poor [16], [18]. Awareness of preventable blindness remains limited; less than half of respondents in multiple studies could name cataract or refractive error as treatable conditions [5], [17].

Gender and sociocultural norms constitute additional layers of exclusion. Women face mobility restrictions, dependence on male family members for decision-making, and greater fear of surgery [40], [41], [64]. Illiteracy and low health literacy amplify these challenges, while misconceptions about postoperative blindness or "loss of vision due to operation" persist across several communities [56]. Among elderly respondents, fatalistic beliefs ("vision loss is part of aging") contribute to low care-seeking behaviour [16]. Barriers also differ by setting: in urban slums such as Korail (Dhaka) and Agrabad (Chattogram), overcrowding, informal livelihoods, and lack of nearby clinics hinder access [5], [16], [18]. Figure 4 summarizes the major categories of barriers, ranking cost and distance highest, followed by gender restrictions and awareness gaps.

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Government and NGO Programs

The Government of Bangladesh, through the Directorate General of Health Services (DGHS), has implemented the National Eye Care (NEC) program to integrate eye health within primary and secondary health services. NEC establishes Eye Units in district hospitals and supports cataract and refraction services through Upazila Health Complexes [8], [72]. Evaluations show significant increases in cataract surgical coverage (CSC) between 2010 and 2020; however, disparities in surgical quality and follow-up persist [24], [67].

The Vision Bangladesh Project, a joint initiative by Sightsavers, BRAC, and DGHS, is one of the most comprehensive NGO–government collaborations. Between 2011 and 2014, it screened over 800 000 adults and performed more than 100 000 cataract surgeries in Sylhet and Chittagong divisions, cutting backlog rates by more than 50 % [23], [24], [76]. Independent evaluations also reported improvements in community awareness and referral pathways. BRAC's Eye-Care Program, launched under its broader Health, Nutrition and Population Program, has established over 50 vision centers, particularly targeting low-income rural women through micro-loan and referral linkages [71]. Orbis International, in partnership with local hospitals, has extended pediatric ophthalmology units and diabetic-retinopathy services across 10 district hospitals, including the establishment of tele-retina pilot sites in Dhaka and Chattogram [25], [26], [85]. In Cox's Bazar, Orbis and IAPB collaborated to provide screening and surgical services for both host and Rohingya refugee populations, addressing extreme humanitarian contexts [7], [25].

Despite these successes, program coverage remains uneven. Districts such as Kurigram and Sunamganj still lack adequately staffed vision centers, and follow-up rates after cataract surgery often fall below 60 % [23], [72]. Figure 6 illustrates subgroup disparities, showing particularly low uptake among rural residents, women, and people with diabetes. Sustained coordination between government and NGOs, along with quality monitoring and financing mechanisms, is necessary to bridge these gaps.

Mobile and Tele-Ophthalmology Models

Recent innovations point to promising avenues for expanding service reach. Evidence from both Bangladesh and comparable low-resource settings supports the use of mobile eye clinics, task-sharing, and tele-ophthalmology for early detection and management of visual impairment [27]–[33], [62]. Mobile outreach camps—equipped for refraction, minor procedures, and cataract pre-screening—have achieved cost-effective service delivery, especially when linked with district hospital surgical facilities [62], [63]. Studies from India and Nepal demonstrate similar success, showing reductions in untreated cataract prevalence following mobile interventions [33], [62].

Tele-ophthalmology has emerged as a scalable model for diabetic-retinopathy screening. Using smartphone-based fundus photography and cloud-based referral systems, pilot projects in Dhaka and Rajshahi achieved image-capture success rates above 90 % and reduced referral turnaround time by nearly half [29], [83], [84]. Task-shifting to community health workers—trained to capture retinal images and deliver preliminary counseling—further improves coverage and reduces ophthalmologist workload [27], [32]. Mobile and tele-linked models are particularly suitable for Bangladesh's dispersed geography, where transportation barriers are substantial.

Integration of these innovations into existing health infrastructure remains a central challenge. Limited internet connectivity in remote districts, lack of trained technicians, and absence of standardized electronic health-record systems constrain scalability. However, evidence from the NEC tele-DR pilot (2023)

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indicates growing feasibility, supported by the Ministry of Health's National NCD Operational Plan and WHO's Integrated People-Centered Eye Care framework [14], [42], [73]. When combined with community awareness campaigns, subsidies for low-income households, and gender-inclusive outreach, mobile and tele-ophthalmology platforms have strong potential to achieve equitable coverage and reduce avoidable blindness in the coming decade.

Overall Synthesis

Taken together, the evidence portrays a health-system landscape marked by both progress and persistent inequity. Cataract and refractive error remain highly treatable yet under-addressed conditions; diabetic retinopathy is an emerging threat that demands integration into primary-care diabetes programs. Socioeconomic barriers continue to constrain demand, while service availability and quality remain uneven. Government–NGO collaborations have achieved measurable gains, but scaling mobile and tele-linked models, supported by sustainable financing and workforce capacity, will be critical for achieving universal eye-health coverage.

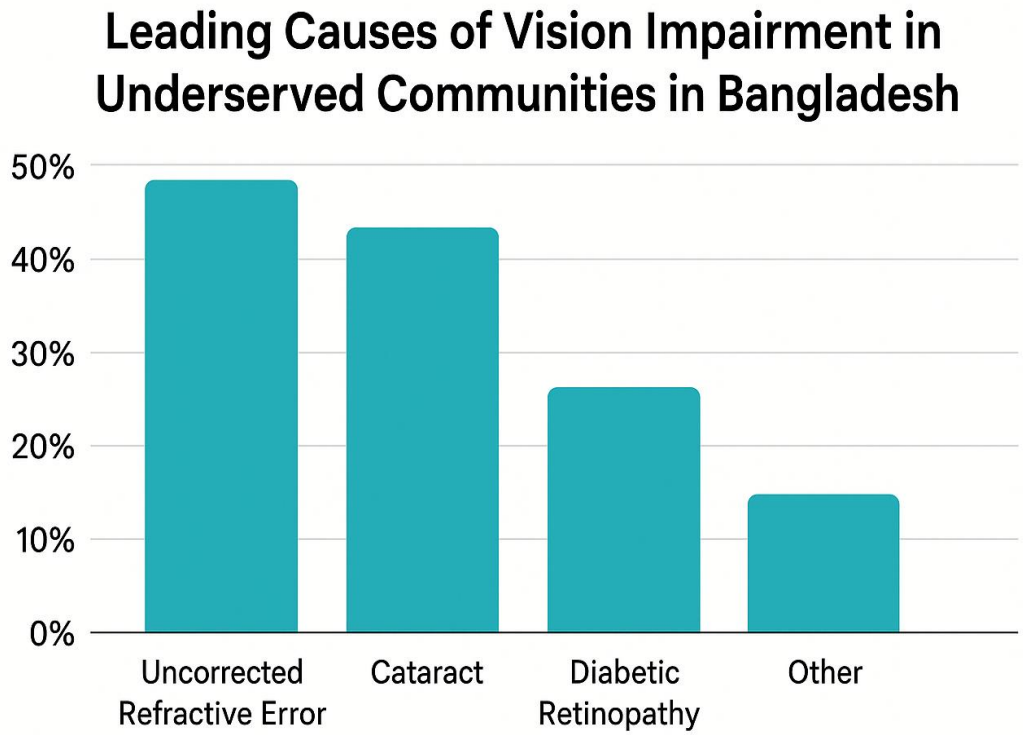

Figure 3. *Leading Causes of Vision Impairment in Underserved Communities in Bangladesh.* Comparative prevalence of uncorrected refractive error, cataract, diabetic retinopathy, and other eye conditions.

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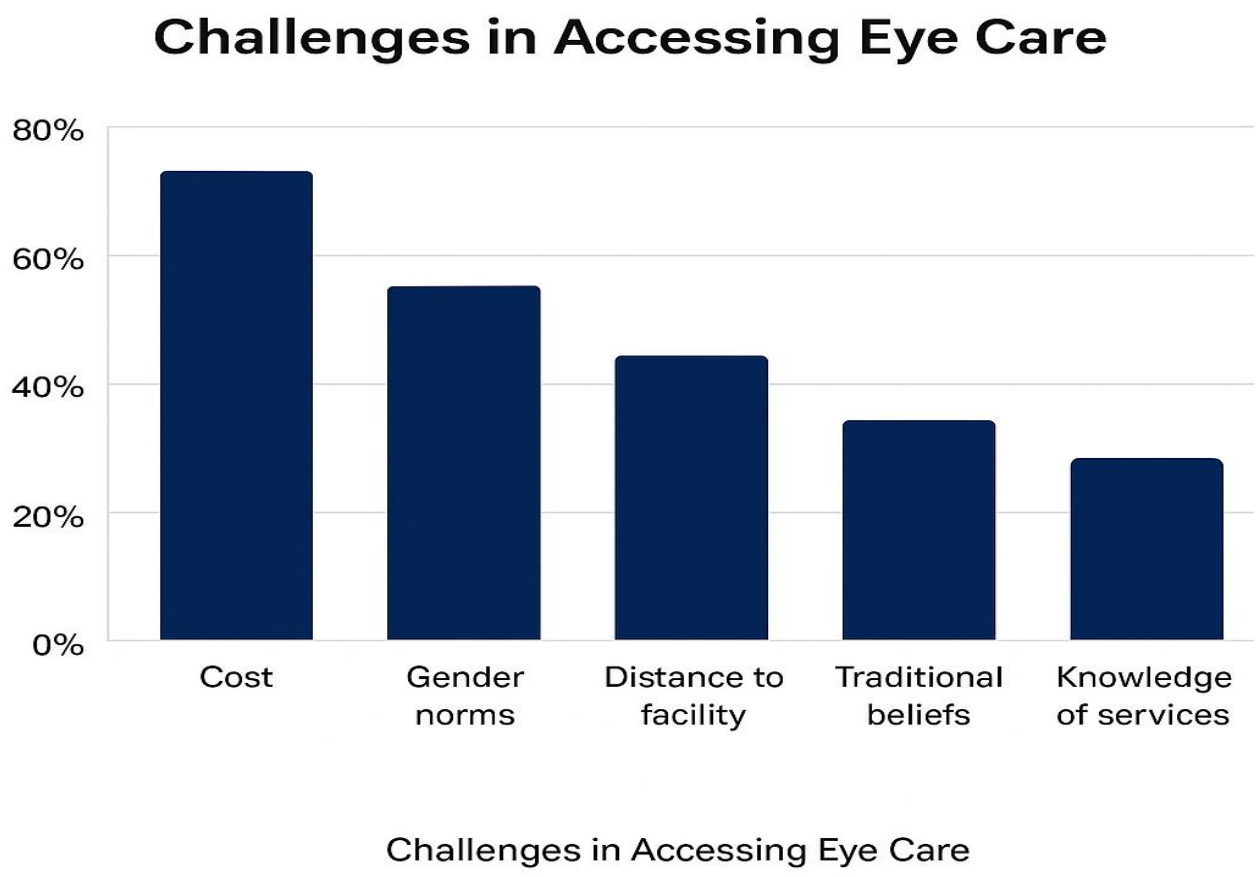

Figure 4. *Challenges in Accessing Eye Care.* Proportion of respondents citing major barriers, including financial limitations, gender norms, distance to facilities, and lack of service awareness.

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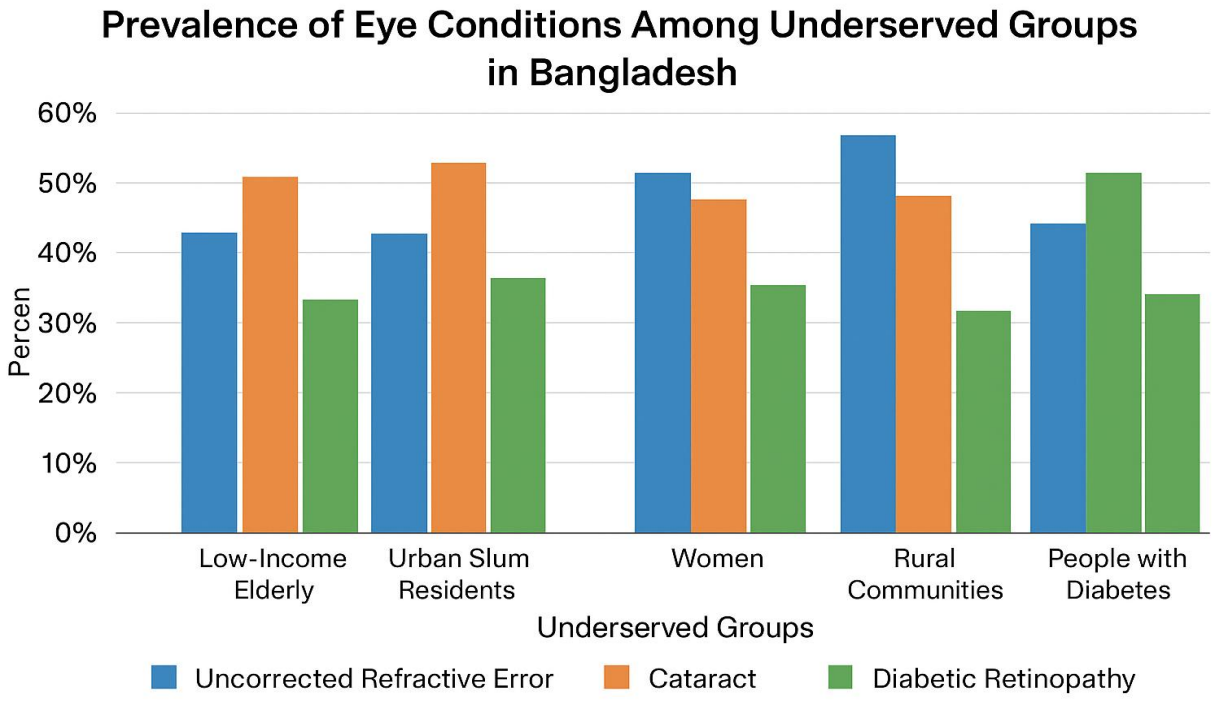

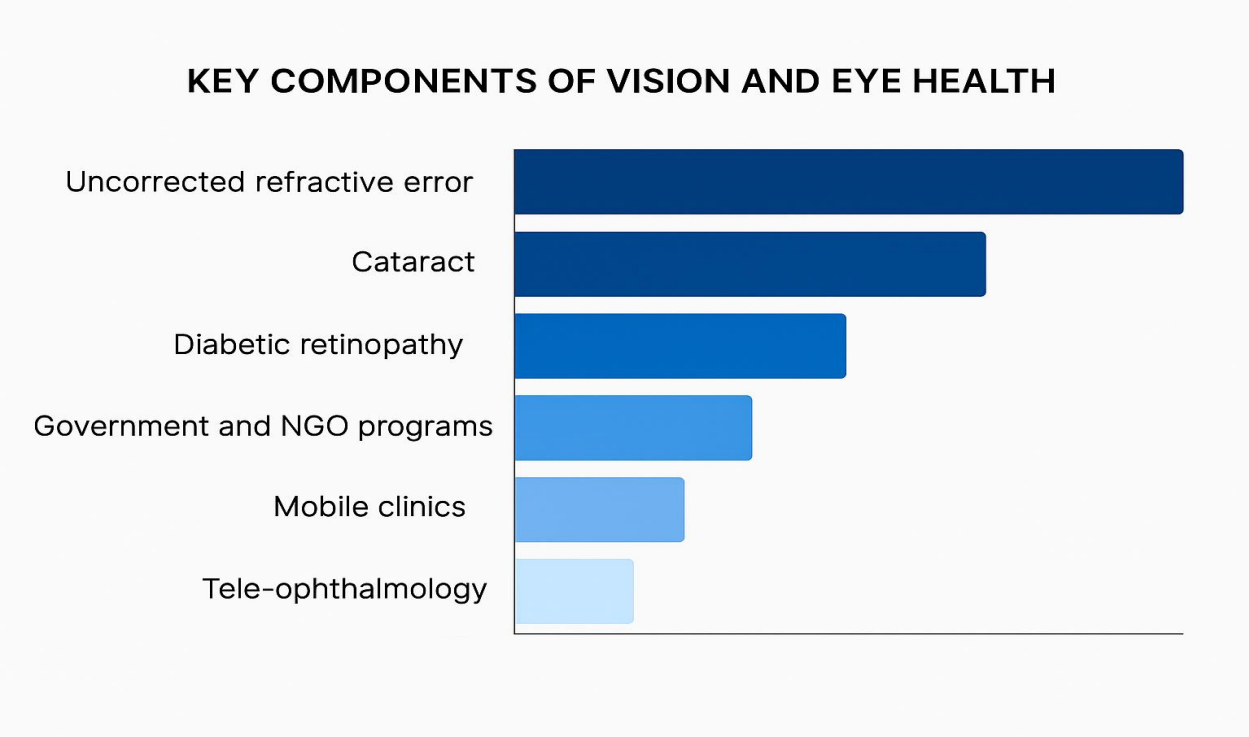

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DISCUSSION

The evidence synthesized in this review highlights that the challenge of equitable eye-care access in Bangladesh is multidimensional—driven by both supply-side limitations and demand-side inequities. Although cataract and uncorrected refractive error remain the dominant causes of avoidable blindness, the persistence of these preventable conditions underscores gaps in early detection, service integration, and social awareness. A multidimensional response—linking community-based detection, affordable refraction and surgery, and digitally enabled referral systems—is essential for reducing these inequities [5], [16], [23].

Community-Level Screening and Task-Sharing

Findings across multiple studies affirm the value of community-level screening and task-sharing with mid-level and primary health workers [27], [32], [83]. In Bangladesh, where ophthalmologists and optometrists are disproportionately concentrated in urban centers, community health workers (CHWs) and NGO field staff represent the most effective interface for reaching rural households. Integrating basic vision screening into existing community programs—such as BRAC's Health, Nutrition and Population Program or the national Community Clinic model—has been shown to increase case detection and referral compliance [71], [72]. Similar evidence from India and Kenya demonstrates that CHWs trained in visual acuity testing and smartphone-based fundus photography can accurately identify more than 85 % of referable cases for further evaluation [27], [33]. This task-sharing model not only mitigates workforce shortages but also fosters local trust and sustained community engagement. When supported by periodic refresher training and remote supervision, it can form the foundation for decentralized primary eye care.

Low-Cost Refraction and Affordable Spectacle Provision

Uncorrected refractive error (URE) continues to represent the single most treatable cause of vision impairment, yet access to affordable correction remains inadequate. The majority of rural optical shops operate privately and remain unaffordable for low-income populations. Studies show that a pair of prescription spectacles may cost the equivalent of 5–10 days' household income in low-income areas [22], [65]. Scaling up low-cost refraction services through NGO-led vision centers and integrating spectacle supply into Upazila Health Complexes could dramatically improve visual outcomes. Sightsavers and BRAC's Vision Bangladesh model already demonstrated success in this regard, distributing affordable spectacles at subsidized rates while linking refraction services with cataract screening [23], [24].

Expanding such models nationally—perhaps through public–private partnerships (PPPs)—would create a sustainable market for low-cost corrective lenses. Moreover, community-based spectacle delivery, coupled with follow-up by CHWs, can ensure consistent usage and early replacement when lenses are damaged. Affordability interventions are thus not peripheral but central to the goal of universal eye-health coverage.

Streamlined Cataract Surgical Pathways

Cataract remains the leading cause of blindness in Bangladesh [2], [3], [4], and despite considerable progress in surgical coverage, large disparities persist between regions and socioeconomic groups [23], [24]. The Vision Bangladesh Project demonstrated that free or subsidized cataract surgeries can halve backlog rates in only a few years when coupled with proactive community outreach and transportation support [24], [76]. However, sustaining this impact requires systemic reinforcement of surgical pathways—standardizing patient referral, preoperative counseling, postoperative follow-up, and outcome tracking.

Integrating cataract services within primary health-care infrastructure is critical. Current models rely heavily on tertiary or NGO-run eye hospitals, which limit access for remote populations. The establishment of district-level eye units under the National Eye Care (NEC) program has improved coverage but remains uneven. Expanding mobile surgical camps—equipped for same-day procedures—

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and strengthening referral links to district hospitals can close geographic gaps [72]. Moreover, continuous quality monitoring using indicators such as cataract surgical coverage (CSC) and postoperative visual acuity outcomes should become standard performance metrics at both district and national levels [67], [68].

Tele-Ophthalmology and Digital Integration

The introduction of tele-ophthalmology for diabetic retinopathy (DR) and glaucoma screening represents one of the most transformative developments in recent years. The growing prevalence of diabetes in Bangladesh (estimated at 13 million adults) creates an urgent need for integrated DR detection within NCD clinics [34], [35]. Early pilots using smartphone-based retinal imaging have achieved image acquisition rates exceeding 90 %, with remote grading accuracy comparable to conventional fundus cameras [29], [83]. These tele-linked models reduce referral delays and enable ophthalmologists to triage cases more efficiently.

Integration of tele-ophthalmology into the existing National NCD Operational Plan would allow diabetic patients to undergo annual retinal screening at community or Upazila levels, reducing both cost and travel burden [73]. The scalability of this approach depends on internet connectivity, data security, and trained technicians capable of operating imaging devices. As WHO's Integrated People-Centered Eye Care (IPEC) framework recommends, telemedicine should be embedded within existing health systems rather than treated as an external innovation [14], [42]. Bangladesh's experience with mobile health and teleconsultation in maternal and child health programs provides a strong foundation for scaling similar models in eye care [71].

Health-System Integration and Multi-Sector Coordination

The persistence of avoidable blindness in Bangladesh is not simply a clinical issue—it reflects structural inequities in the health system. Integration of eye health within Universal Health Coverage (UHC) and primary-care packages is vital for sustainability. The NEC has made progress in establishing eye units at district hospitals, but operational gaps remain in human-resource deployment, data management, and coordination between public and NGO sectors [72]. Routine inclusion of eye-care indicators in the national Health Management Information System (HMIS) could enable better tracking of surgical outcomes, DR screening rates, and refractive error correction coverage.

Effective collaboration between government, NGOs, and private sectors has already proven successful in scaling cataract and outreach services [23]– [26]. Extending such collaboration to encompass telehealth, diabetic care, and school-based vision screening could generate synergistic gains. School-based screening programs, for instance, have demonstrated cost-effectiveness and high coverage among children aged 6–15 years in South Asia [10], [52]. Integrating them into Bangladesh's national education and adolescent health programs could provide a sustainable platform for early detection.

Workforce Development and Capacity Building

The shortage of skilled ophthalmic professionals remains a major bottleneck, particularly outside metropolitan areas. The ratio of ophthalmologists to population (≈1:125,000) remains far below WHO recommendations [13]. Expanding mid-level cadres—optometrists, ophthalmic assistants, and vision technicians—is therefore essential. The NEC, with support from Orbis and BRAC, has initiated several training programs, but retention and equitable deployment remain challenges [25], [71]. Strengthening local training institutes and offering rural service incentives could balance workforce distribution. Additionally, cross-training existing community health workers in basic eye screening and health education can further extend reach.

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CrossRef DOI: 10.62127/aijmr.2025.v03i06.1150

Equity, Gender, and Cultural Dimensions

Persistent gender and income disparities require targeted policy attention. Women are both more affected by vision impairment and less likely to seek care due to sociocultural constraints [40], [41], [64]. Community sensitization, female CHW deployment, and inclusion of eye-health education in women's microcredit and self-help groups have shown to improve service uptake [71]. Furthermore, religious leaders and local influencers can be engaged to counter misconceptions about cataract surgery or eye donation, as demonstrated by Orbis-led community campaigns [26]. Ensuring that interventions are gender-responsive and socially inclusive is a precondition for universal eye health.

Monitoring, Evaluation, and Policy Implications

To ensure accountability, all interventions should be linked to measurable indicators. Cataract surgical coverage, postoperative visual outcome rate, DR screening coverage among diabetics, and spectacle coverage rate are recommended metrics [67], [68], [73]. Embedding these within national monitoring frameworks will allow Bangladesh to benchmark progress toward WHO's Vision 2030 targets. Figure 5 summarizes the conceptual framework connecting these structural determinants with equitable eye-health outcomes, while Figure 6 outlines the temporal roadmap for scaling these strategies between 2025 and 2035.

In policy terms, Bangladesh is well positioned to transition from a charity-driven model to a people-centered, system-based model of eye health. This requires political commitment, domestic resource mobilization, and stronger coordination between the Ministry of Health, NGOs, and private partners. The success of Vision Bangladesh and Orbis initiatives demonstrates that partnership models are both feasible and effective when embedded within government systems [23]– [26]. Replicating these across all 64 districts could accelerate progress toward the elimination of avoidable blindness.

SUMMARY

In summary, the convergence of evidence supports a comprehensive, multi-tiered strategy: (1) decentralized screening through CHWs and schools, (2) affordable refraction and spectacle provision, (3) equitable cataract surgical pathways with financial and transport support, and (4) tele-DR screening integrated into NCD clinics and district hospitals. Embedding these services within the primary-care platform, coupled with robust monitoring and cross-sector collaboration, offers the most pragmatic route to closing existing eye-health inequities in Bangladesh and advancing toward universal eye-health coverage by 2035.

CONCLUSION

Bangladesh stands at a pivotal juncture in its effort to eliminate avoidable blindness. Despite significant progress through the National Eye Care (NEC) program and NGO-government partnerships such as Vision Bangladesh and Orbis initiatives, the persistence of preventable visual impairment signals an unfinished agenda. The accumulated evidence from national surveys, program evaluations, and community studies demonstrates that a large proportion of blindness and low vision continues to stem from conditions that are easily diagnosable and treatable particularly uncorrected refractive error, cataract, and diabetic retinopathy [3], [4], [10], [34]. Addressing these challenges requires a paradigm shift from hospital-centric and project-based interventions toward an integrated, people-centered approach embedded within Bangladesh's universal health-coverage framework.

Expanding community-based vision screening through trained community health workers (CHWs) and school programs represents the most immediate opportunity for early detection. Low-cost refraction and subsidized spectacle distribution must be scaled through public–private partnerships to ensure

Advanced International Journal of Multidisciplinary Research
E-ISSN: 2584-0487
editor@aijmr.com
Volume 3, Issue 6, November-December 2025
CrossRef DOI: 10.62127/aijmr.2025.v03i06.1150

affordability and continuity of care. Equally, mobile surgical and diagnostic units linked to district hospitals can bridge the geographical divide, bringing cataract and refraction services directly to underserved populations in chars, coastal belts, and hill tracts.

The future of equitable eye health also depends on the strategic deployment of tele-ophthalmology. Integrating tele-retinopathy screening within diabetes and NCD clinics can substantially improve early detection of retinal disease, while reducing travel burden and costs for patients. When connected through robust referral pathways to district and tertiary centers, such digital platforms can transform coverage and efficiency. Continuous quality monitoring—through cataract surgical coverage (CSC), postoperative outcome tracking, and DR screening indicators—should become standard within the national Health Management Information System (HMIS) to guide performance-based funding and accountability.

Equity considerations must remain central. Women, the elderly, slum dwellers, and persons with chronic illness require targeted inclusion through gender-responsive community outreach and financial protection schemes. Collaborative governance—linking DGHS, NEC, NGOs, and private optometry networks—will be crucial for sustainability. With political commitment, resource mobilization, and coordinated stakeholder engagement, Bangladesh has the capacity to achieve universal eye-health coverage by 2035 and to serve as a regional model for integrated, community-driven eye-care delivery.

Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article. No funding body influenced the design, interpretation, or reporting of this review.

Acknowledgements

The authors gratefully acknowledge the Directorate General of Health Services (DGHS) and the National Eye Care (NEC) Program for access to policy documents and epidemiological data; BRAC Health, Nutrition and Population Program for community-level insights; Sightsavers Bangladesh for evaluation reports on the Vision Bangladesh Project; and Orbis International Bangladesh for their extensive contributions to pediatric, cataract, and diabetic-retinopathy initiatives. We also extend sincere appreciation to local health workers, optometrists, and community volunteers in rural and urban sites whose commitment to outreach and data collection has been instrumental in expanding access to vision care. Their collective efforts form the backbone of the progress documented in this review.

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Advanced International Journal of Multidisciplinary Research
E-ISSN: 2584-0487
editor@aijmr.com
Volume 3, Issue 6, November-December 2025
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