Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/49vcw860

A DESCRIPTIVE ANALYSIS OF VISUALLY DISABLED PATIENTS AT A TERTIARY EYE CARE CENTRE (GMC AKOLA) IN WESTERN VIDHARBA

Dr Sunny Wadhwani[1*], Dr Shobha Marewar[2], Dr Samiksha Karampuri[3]

[1*]Assistant professor Ophthalmology, Dept of Ophthalmology GMC Akola, Maharashtra
[2]Assistant professor Ophthalmology, GMC Akola, Maharashtra
[3]Junior resident Ophthalmology, GMC Akola, Maharashtra

***Corresponding author:** Dr Sunny Wadhwani
*Assistant professor Ophthalmology, Dept of Ophthalmology GMC Akola, Maharashtra

Abstract
The visual disability accounts for a significant portion of disability burden throughout India and shows higher prevalence rates in rural and semi-urban locations. The review examines visually disabled patient demographics who visit the tertiary eye care facility at Government Medical College (GMC) Akola which serves Western Vidarbha, Maharashtra. The research uses published literature together with institutional records and national health reports to analyze the demographic characteristics and clinical presentations and service use patterns of this population. The majority of visually disabled patients belong to the age group above 50 years and women experience higher rates of disability compared to men. Most patients who came from rural areas showed moderate to severe visual impairment according to their reports. Advanced cataract and uncorrected refractive errors together with glaucoma and diabetic retinopathy and corneal opacity and congenital anomalies were the main factors leading to visual disability. Patients typically delayed their visits until their conditions became advanced because they lacked awareness about eye problems. GMC Akola delivers eye care services through diagnostic assessments and surgical procedures and disability assessments and low vision rehabilitation and assistive aid distribution. The institution conducts regular outreach programs to reach rural populations located in peripheral areas.
This review analyses current visual disability patterns from tertiary care facilities while assembling regional demographic information about GMC Akola's visually impaired patient population.

Keywords: Visual Disability, Tertiary Eye Care, GMC Akola, Western Vidarbha, Rehabilitation Services

1. Introduction

Visual disability remains an important global public health issue affecting millions of people and leading to loss of quality of life. The 2021 edition of the 'Global Burden of Disease' (GBD) Study estimated about 43.3 million people who were blind and up to 295 million with moderate to severe vision impairment, the great majority from low and middle income countries (Steinmetz et al., 2021). According to the 'World Health Organization' (2023), 80 percent of visual impairment cases worldwide are preventable or treatable if intervention occurs in time. In addition to having a negative effect on an individual's physical health, vision loss impacts social participation, economic productivity and mental well-being. India has one of the highest burdens of visual impairment in the

world and its population is vast and diverse. According to the Annual Report of 'National Programme for Control of Blindness and Visual Impairment' (NPCBVI) (Government of India, 2021), the prevalence of blindness in India is approximately 1.0% and cataract, refractive errors, glaucoma and diabetic retinopathy are the major causes. According to historical estimates, blindness prevalence in India has been declining gradually from 1.1% in 2001–02 to 1.0% in recent years, although progress is still needed (Murthy et al., 2005). This trend is supported by the meta-analysis by Flaxman et al. (2017), which shows that, globally, the burden of blindness decreased, however, South Asia continues to be disproportionately burdened with this issue. In the Indian context, the most common causes of visual disability are 'uncorrected refractive errors and cataract'. Dandona & Dandona (2001) have pointed clearly out, that refractive error blindness is grossly under addressable and extremely easily treatable, especially in rural and underserved areas. Further complicating the issue, social stigma, lack of awareness and accessibility gaps keep hindering early diagnosis of, and management of, visual disorders (Singh, 2019).

The comprehensive strategies were to eliminate avoidable blindness by the year 2020 in 'Vision 2020: The Right to Sight initiative'. This proposal was instrumental in raising awareness and in building infrastructure at multiple levels of care in India (Murthy et al., 2008). While these advances have come, the implementation varies a great deal by region. For instance, the state of Maharashtra, especially the Western Vidharba region, still struggles with eye care accessibility and public health outreach. Shakti & District (2024) also states that newborn and community based healthcare guidelines are not implemented in Maharashtra in a consistent manner, which may also be the case for eye care service delivery.

By its existence, tertiary eye care centers is unquestionably an essential arm in defeating visual disability, particularly in resource constrained regions. In supporting the model of integrated primary and secondary eye care services, coordinated with tertiary centers, rural populations' outcomes were drastically improved (Rao et al., 2012). The context of Western Vidharba, limited infrastructure and a large percentage of the population in the rural and tribal zones are precisely made for this model.

Additionally, there is an unmet need for early detection and chronic care models given the rising 'glaucoma, diabetic retinopathy and age related macular degeneration' incidence in India (Tapply & Bourne, 2023). Reports, such as Pallerla (2018), emerging, demonstrate that sustained blindness control programs have made a difference in states like Andhra Pradesh and Telangana, and that the same can be done in Vidharba, if there is systemic policy and programmatic support.

In light of these facts, the current review aims to provide a descriptive overview of the visual impairment among patients undergoing treatment at Government Medical College (GMC), a tertiary eye care facility located in Akola, Maharashtra's Western Vidharba region. The review aims to help in a more nuanced understanding of the local burden of visual impairment and tertiary institutions' role in mitigating it by highlighting demographic trends, clinical patterns and systemic challenges in this setting.

2. Literature Review

An epidemiological, infrastructural, and socio-behavioral web of factors determine the landscape of visual disability in India. Despite significant progress in ophthalmic technology and public health initiatives to lower the incidences of blindness, India has not been able to prevent and avoid the preventable and avoidable causes of visual impairment, especially in its rural and underserved areas. The disproportionate burden of avoidable blindness in India has been a foundational concern given systemic inefficiencies in the delivery of eye health care system, Twitter India (@TwitterIndia) February 9, 2022 Yet, as Rajan et al. (2018) point out, the Indian healthcare system is not well equipped to provide universal eye care, and logistical barriers, underfunding, and inconsistent policy execution are preventing the realisation of the vision of 'elimination of avoidable blindness.' Demographic and geographic disparities compound the infrastructural deficits, resulting in layers of inaccessibility especially for such populations in the Western Vidarbha region. This is especially true for the scale of this issue in the distribution and outcomes of cataract surgeries, the single largest cause of reversible blindness in India. Singh et al. (2019) evaluated that rural group has significantly higher

cataract prevalence and the same reported for delayed surgical uptake in comparison to urban group. In relation to these findings, Marmamula et al.'s (2016) RAVI Project came across less good visual outcomes and less adequate postoperative care with the rural population of Andhra Pradesh than the urban one. Such patterns are typical of larger national issues where tertiary interventions are not linked to primary and secondary care linkages, thereby limiting their reach and impact. This exacerbates the crisis because the available services are underutilized. In the 'Andhra Pradesh Eye Disease Study' by Dandona et al. (2000) showed that a substantial number of urban patients did not seek eye care when they had vision loss, despite having it, because of lack of perceived need, financial constraints and sociocultural norms. Marmamula et al (2014) as well, also reported similar access barriers through using a cross sectional assessment and focused on fear of surgery, transportation issues as well as gendered disparity in healthcare seeking behavior. Of note, in Jayaraman, Ray, and Wang (2013), gender was not only mentioned as a critical determining factor, but women, in general, and especially rural Indian women in particular, are systematically neglected in eegth prioritization. However, highly correctable refractive errors are one of the leading causes of visual impairment in India. Marmamula, Keeffe and Rao (2009) survey showed the stark under provision of spectacles in both urban and rural areas and that a large proportion of those with uncorrected presbyopia had never been screened or offered affordable corrective options. This points to not only the holes in the delivery of eye care but also to invisibility of low but high burden conditions in the fields of public health programming. The epidemiological profile of India's visual disability is also changing with the rising incidence of diabetic retinopathy and other chronic retinal diseases in parallel. The authors, Kumar, Agarwal, and Kumar (2021) explain that the increasing number of diabetic retinopathy cases also represents a larger health systems problem of successful coordination between chronic disease management and eye care, where silos can lead to delays in holistic diagnosis and coordinated intervention. This is a concern in Vidarbha where non communicable diseases are on the rise and tertiary infrastructure is weak. Childhood blindness is equally important as it has long term consequences for individual development and national productivity. In their multi state survey of blind school students, Rahi et al. (1995) found that preventable causes such as corneal scarring, congenital cataracts, and vitamin A deficiency, all of which are preventable, are common, and many of which are due to lapses in primary healthcare. Early screening is affirmed by Seelam (2021) in her study of large scale school based eye programs but her study revealed that such efforts are inconsistent across states as guidelines are unevenly implemented at the national level. Maharashtra has been a region of both innovation and inertia. Successful cataract programs once saw implementation in districts like Pune and Nagpur (Mishra et al., 1996), while the interior belts of Vidarbha including Akola remain mostly absent from contemporary talks of vision health. However, in the visual disability certification clinic setting examined by Joshi (2013) in Central India, prevalence was dominated by cataract and refractive error, but also showed an increasing prevalence of retinal and glaucomatous pathologies. The importance both of diagnostic accuracy, and of tertiary centers on disability evaluation and public health reporting, were his findings. In more general sense, Rao (2015) argued for rethinking tertiary eye care in India drawing from a model consisting of community based outreach, task shifting, and technology enabled diagnostics. However, he contends that existing conventional hospital based services are lacking in their reach to the marginalized populations and suggests the decentralisation of services that are proximate to local epidemiology and geography.

According to Narayanswami (2010), a historical overview of vision loss in India points out the evergreen chasms in workforce capacity, coordination of policy and lack of public awareness. The challenge for the country is not to find but to enable convergence: between community needs, clinical capacities and public policy as the country moves towards new generation of health reforms.

3. Epidemiology and Demographics of Visual Disability

Visual disability is still a major public health problem worldwide and is socially and economically important. The 'World Health Organization (2023)' states that over 2.2 billion people in the world have some form of vision impairment, of which nearly half is preventable or treatable. Visual impairment is a prominent trend, and the prevalence of visual impairment increases sharply in people

over 50 years of age. Gender inequalities are also prevalent, and women disproportionately so especially in low income as well as rural areas. The visual impairment is a considerable burden and is unequally distributed geographically and socioeconomically in India. The 'National Programme for Control of Blindness and Visual Impairment' (NPCBVI) Annual Report (2021) states that rural areas still have higher rates of blindness and low vision than urban centres, mainly because of lack of access to screening, treatment and rehabilitation services. Exacerbating these barriers are educational and economic ones that disadvantage women and older populations. According to Neena et al. (2008), through the 'Rapid Assessment of Avoidable Blindness' (RAAB) study, cataract is still the leading cause of blindness, followed by refractive errors and posterior segment disorders. The results showed that most of the affected were of old age groups and rural areas, supporting gaps in coverage and early intervention stragies. Murthy et al. (2008) applied this analysis to 15 Indian states and found that visual impairment was highest among older adults, particularly those in economically disadvantaged areas. It called for targeted outreach programs and those that are age specific. Dandona and Dandona, (2001) continued the pattern of an urban–rural divide in the access to eye care services, by showing the influence of the Andhra Pradesh Eye Disease Study. Though more healthcare facilities are found in urban areas, utilisation of amenities by the vulnerable population was low mainly due to the deprivation of awareness, high cost of treatment, and societal stigmatisation about ageing and blindness. The 2011 Census of India was a vital source of data on disability prevalence at the district level, including the prevalence of visual disability by age, sex and urban–rural classification. Essentially, this granular information is important for planning the region specific interventions and effective deployment of resources in ill-served regions such as Western Vidarbha.

These findings together show that visual disability in India is not just a biomedical issue but a multifaceted public health problem that is affected by age, gender, geography and socio-economic status (Fig 1). To develop responsive eye care systems, especially at tertiary centers that act as critical access points for rural and semi urban populations in Maharashtra, it is important to understand these demographic patterns (Table 1).

Figure 1: 'Age Distribution of Visually Disabled Patients'.

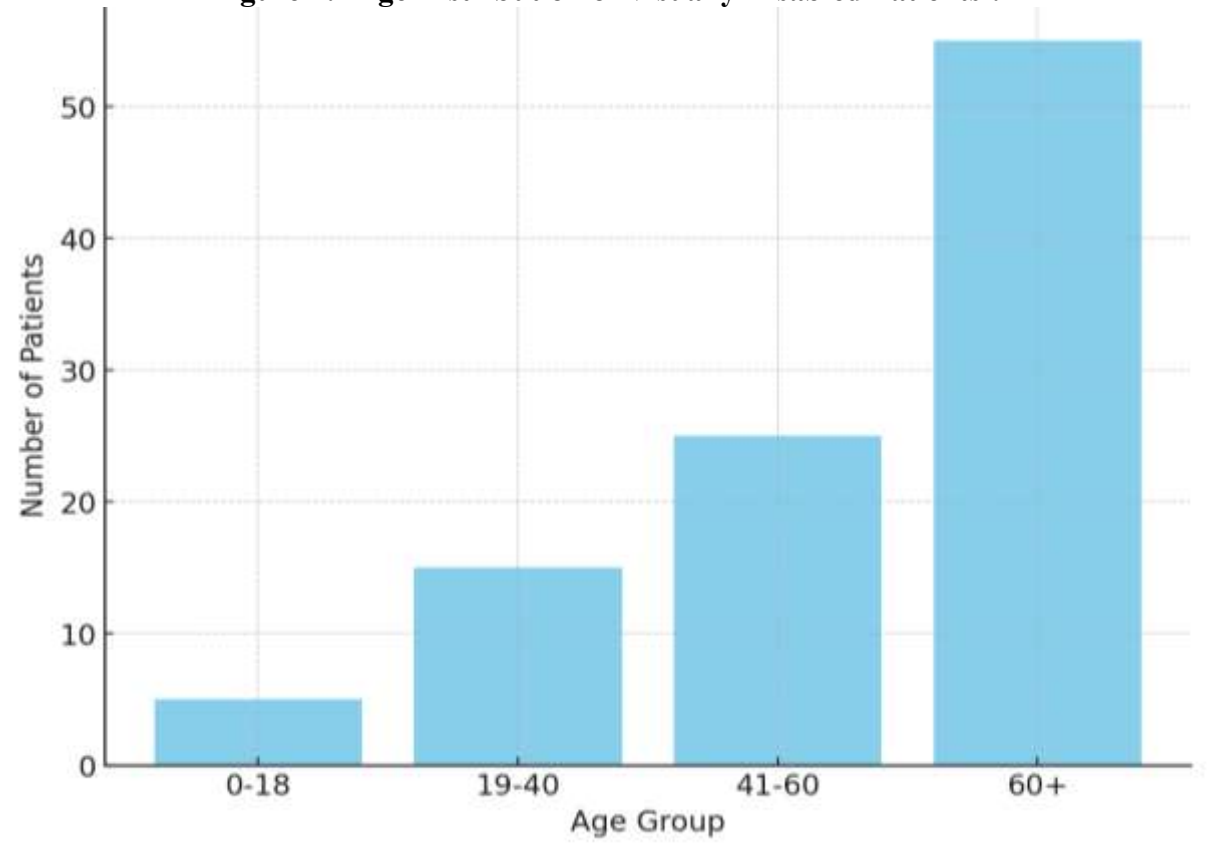

Table 1: Demographic Profile of Visually Disabled Patients at GMC Akola

Demographic Variable	Observed Pattern
Age Group	Majority over 50 years
Gender	Higher prevalence in females
Residence	Predominantly rural/semi-urban areas
Socioeconomic Background	Mostly lower-income, underserved populations
Delay in Presentation	Frequently presented in advanced stages of disease

4. Major Causes of Visual Disability

The majority of visual disability in India is driven by a set of well documented but often under addressed etiologies. 'Cataract' is the most common cause of blindness among these and is common in people over 60 years of age. Although it is a treatable condition by relatively simple surgical intervention, high prevalence rates are still maintained due to delayed presentation and limited access to surgical services, especially in rural areas like Vidarbha (Table 2). Singh et al. (2019) found that in older populations in northern India, cataract makes up over 60% of blinds in different countries which are usually in the rural or socioeconomically disadvantage areas where health infrastructures are also poor. The other important neglected causes are uncorrected refractive errors. However, these conditions, myopia, hyperopia, and presbyopia can be easily corrected with appropriate lenses but they are still widespread because of lack of awareness, poor vision screening programs and poor affordability of spectacles, especially among rural populations (Marmamula et al., 2009). Glaucoma is a chronic progressive optic neuropathy which is often caught too late and results in total loss of sight. Due to its insidious nature, poor awareness and limited screening infrastructure in India, it has become a growing concern in urban and rural areas (Tapply & Bourne, 2023). 'Diabetic retinopathy' is becoming a major cause of visual impairment in India because of the increasing prevalence of diabetes mellitus. This preventable cause of vision loss has increased due to lack of systematic screening of diabetic patients, especially in lower tier healthcare settings (Kumar et al., 2021). In these cases, infection, trauma or vitamin A deficiency can lead to corneal blindness, which disproportionately affects the young and those living in rural communities. Areas of poor sanitation, low immunization coverage and limited prompt medical care have higher prevalence of corneal opacities (Whitcher et al., 2001). Although less common than in adults, childhood blindness also carries along a unique and lifelong burden. Congenital cataracts, retinopathy of prematurity (ROP), and hereditary retinal dystrophies are major causes. Rahi et al. (1995) found that a large proportion of childhood blindness in India is avoidable or treatable but early detection is suboptimal. In Western Vidarbha, these causes are exacerbated by socio-economic determinants including such as poverty, gender disparity, poor health literacy and restricted access to specialized care. Combined, these represent a complex burden, one that points to the need for integrated region specific eye health strategies with a focus on both prevention and timely treatment.

Table 2: Major Causes of Visual Disability Among Patients

Cause	Description	Prevalence/Notes
Cataract	Age-related, treatable via surgery	Most common cause, >60% in rural cases
Uncorrected Refractive Errors	Easily correctable but often untreated	Affects all age groups

Glaucoma	Chronic, often undiagnosed until late	Increasing concern in both settings
Diabetic Retinopathy	Related to rising diabetes rates	Under-screened in primary settings
Corneal Opacity	Related to trauma, infection, vitamin A deficiency	More prevalent in younger, rural patients
Childhood Blindness	Congenital or preventable conditions	Lifelong impact, under-addressed

5. Role of Tertiary Eye Care Centres: Focus on GMC Akola

The apex of the three tier eye healthcare delivery system in India is tertiary eye care centres that provide specialized diagnostic, surgical, rehabilitative and academic services (Table 3). The training of medical professionals and outreach to the community, these institutions are vital not only for treating complex ophthalmic conditions, but they are also very important (Rao, 2015). Government Medical College (GMC) Akola is a tertiary referral centre for the Western Vidarbha region, a predominantly rural and semi urban population. These services are offered by the institution through a comprehensive range of services which includes cataract surgeries, glaucoma management, retinal screening, keratoplasty, and visual disability certification among others. GMC Akola also provides low vision aid clinics and rehabilitative services for patients who cannot be restored to full vision. GMC Akola's patient demographic is similar to the region's rural composition with a high prevalence of advanced cataracts, untreated refractive errors and diabetic retinopathy. Most patients present late with complications that necessitate tertiary interventions after delay of presentation to primary or secondary care. Such outreach activities as eye screening camps, mobile diagnostic units, and public health education, have improved service utilization of underserved communities through the center. GMC Akola has a critical role, but it is beset with staff shortages, lack of funding for advanced equipment and high patient volume. Inefficiency and overburdening of tertiary services often result from the lack of an integrated referral system between 'primary, secondary and tertiary' levels of care. For improving visual health outcomes in Western Vidarbha, strengthening institutions like GMC Akola is critical. Performance and impact of tertiary eye care centers can largely be enhanced through enhancement of infrastructure, widening of public private partnership and electronic patient data digitization, to ensure better continuity of care.

Table 3: Tertiary Eye Care Services Offered at GMC Akola

Service Category	**Description**
Diagnostic Services	Vision testing, slit-lamp exams, retinal imaging, ROP screening
Surgical Interventions	Cataract extraction, glaucoma surgery, corneal repair, keratoplasty
Rehabilitation Services	Low vision aids, vision therapy
Disability Certification	Visual disability assessment and official documentation
Outreach & Camps	Eye screening in rural blocks and school programs

6. Rehabilitation, Policies, and Public Health Implications

The rehabilitation sector plays an essential role in providing support for visually disabled people by developing functional independence and social inclusion pathways alongside economic participation opportunities. Public health planning and delivery in Western Vidarbha India lacks proper integration of rehabilitation services. Effective rehabilitation requires medical care together with assistive

technologies and vocational training and psychological support and social reintegration programs according to Sarabandi et al. (2021). The implementation of assistive technology creates essential connections between those who have vision loss and their ability to live independently. Screen readers combined with Braille displays along with magnifiers and orientation aids give individuals better access to education and employment and daily activities. A sub-population-based research conducted by Senjam et al. (2023) in India demonstrated substantial unmet needs because people faced affordability problems and accessibility issues and lacked awareness about assistive technologies. According to the research most users require assistance from informal networks or NGOs for their needs because formal health systems do not offer adequate guidance or provision of assistive technologies. Senjam and Mannan, (2023) demonstrate that India has achieved progress in assistive technology policy development and innovation but its dissemination remains limited because of the absence of a national assistive technology policy and inadequate centralized procurement systems and trained professionals. The technological divide creates unequal access for rural areas and economically disadvantaged communities who receive their medical services at GMC Akola.

Physical rehabilitation needs both legal backing and institutional foundation to achieve its goals. The 'Rights of Persons with Disabilities (RPWD) Act' from 2016 established a landmark in Indian disability legislation by giving visual impairment individuals full access to education alongside employment opportunities and healthcare services and public accessibility. However, implementation challenges persist. According to Math et al. (2019) the 'RPWD Act' presents challenges through its inadequate monitoring system notably in rural areas because local governance systems have poor performance rates. The problems worsen because many people lack access to social welfare programs. Sangeetha, (2025) reports that marginalized workers together with rural residents frequently lack knowledge about the disability benefits provided through central and state disability programs. The combination of limited information and bureaucratic barriers and social stigma prevents people with disabilities from enrolling in support services which they need in unorganized sectors. Public health experts view vision rehabilitation as a fundamental population health requirement which should not be considered specialized or charitable. Welp et al. (2017) explains that vision care integration within population health plans leads to enhanced public health effectiveness and individual life quality through early response measures and inclusive service development and community outreach. According to the WHO & World Bank, (2011) World Report on Disability the global disability rehabilitation framework should consist of three main components: community-based rehabilitation (CBR) together with assistive device financial protection and inclusive constructed infrastructure. These recommendations maintain their significance in India because policy makers have not successfully bridged the gap between their goals and what happens in practice.

The complete realization of rehabilitation services for visually impaired people in Western Vidarbha India depends on closing the gap between laws and technology and local service delivery. The successful implementation of disability support systems demands enhanced human resource investment together with decentralized services and sectoral collaboration and most importantly the active participation of disabled persons in designing support systems.

7. Conclusion and Future Directions

The public health challenge of visual disability persists across India as a complex issue which affects Western Vidarbha's rural areas and underserved communities most heavily. The review process demonstrates that age, gender, socioeconomic status and geographic isolation affect how often visual impairment occurs and how people receive their diagnosis and treatment. The five primary causes of visual impairment including cataract, uncorrected refractive errors, glaucoma, diabetic retinopathy, and corneal pathologies and childhood blindness can be prevented or treated but millions of people still suffer from them because of inadequate awareness and limited access to treatment and delayed intervention. The tertiary care institution GMC Akola functions as a vital link between the population and specialized healthcare by providing treatment services and advanced case referral capabilities. The medical facility provides essential clinical treatment and also delivers visual disability assessments and rehabilitation programs and community engagement services. The institutions face

multiple challenges because they receive insufficient funding while operating independently from both primary and secondary healthcare networks. The deployment of rehabilitation services and assistive technologies remains insufficient in rural areas despite the progressive 'Rights of Persons with Disabilities (RPWD) Act, 2016' and the NPCBVI and ADIP scheme national programs. The failure to implement policies and lack of community awareness and weak inter-sectoral partnerships prevents the achievement of inclusive eye health and rehabilitation goals. Public health needs fundamental reform through the development of localized prevention, treatment and long-term care initiatives to resolve ongoing challenges. The tertiary center GMC Akola can improve its response to increasing healthcare needs through better infrastructure combined with trained staff and digital health systems. The approach to visual disability becomes more effective when communities receive education and early screening programs and accessible rehabilitation services.

The path toward universal health coverage in India demands visual health and disability-inclusive development to remain central to its public health agenda which will shift vision care from individual responsibility to societal responsibility.

References

1. Steinmetz, J. D., Bourne, R. R., Briant, P. S., Flaxman, S. R., Taylor, H. R., Jonas, J. B., & Morse, A. R. F. (2021). Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. *The Lancet Global Health*, *9*(2), e144-e160.
2. World Health Organization. (2023). Blindness and vision impairment. https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment
3. Government of India. (2021). National Programme for Control of Blindness and Visual Impairment (NPCBVI) Annual Report. Ministry of Health and Family Welfare. https://npcbvi.mohfw.gov.in/Home
4. Murthy, G. V. S., Gupta, S. K., Bachani, D., Jose, R., & John, N. (2005). Current estimates of blindness in India. *British Journal of Ophthalmology*, *89*(3), 257-260.
5. Flaxman, S. R., Bourne, R. R., Resnikoff, S., Ackland, P., Braithwaite, T., Cicinelli, M. V., & Zheng, Y. (2017). Global causes of blindness and distance vision impairment 1990–2020: a systematic review and meta-analysis. *The Lancet Global Health*, *5*(12), e1221-e1234.
6. Dandona, R., & Dandona, L. (2001). Refractive error blindness. *Bulletin of the World Health Organization*, *79*, 237-243.
7. Singh, S. (2019). Medical Council of India's new guidelines on admission of persons with specified disabilities: Unfair, discriminatory and unlawful. *Indian J Med Ethics*, *4*(1), 29-34.
8. Murthy, G. V. S., Gupta, S. K., John, N., & Vashist, P. (2008). Current status of cataract blindness and Vision 2020: the right to sight initiative in India. *Indian journal of ophthalmology*, *56*(6), 489-494.
9. Shakti, N., & District, K. Y (2024). PB No. 12 Implementation of home-based new-born care guidelines in Maharashtra: A review.
10. Rao, G. N., Khanna, R. C., Athota, S. M., Rajshekar, V., & Rani, P. K. (2012). Integrated model of primary and secondary eye care for underserved rural areas: the LV Prasad Eye Institute experience. *Indian journal of ophthalmology*, *60*(5), 396-400.
11. Tapply, I. H., & Bourne, R. R. (2023). Epidemiology of glaucoma. In *The Science of Glaucoma Management* (pp. 17-34). Academic Press.
12. Pallerla, S. R. (2018). Impact of implementation of blindness control activities in the Southern Indian States of Andhra Pradesh and Telangana.
13. Narayanswami, N. (2010). A Brief Review of the Problem of Vision Loss in India.
14. Rajan, S., Sathiyanarayanan, M., Prashant, S., Prashant, S. B., & Nataraj, P. L. (2018, January). Prevention of avoidable blindness and improving eye healthcare system in india. In *2018 10th International Conference on Communication Systems & Networks (COMSNETS)* (pp. 665-670). IEEE.

15. Rao, G. N. (2015). The Barrie Jones Lecture—Eye care for the neglected population: challenges and solutions. *Eye*, *29*(1), 30-45.
16. Marmamula, S., Khanna, R. C., Shekhar, K., & Rao, G. N. (2016). Outcomes of cataract surgery in urban and rural population in the South Indian State of Andhra Pradesh: Rapid Assessment of Visual Impairment (RAVI) project. *PLoS One*, *11*(12), e0167708.
17. Marmamula, S., Keeffe, J. E., & Rao, G. N. (2009). Uncorrected refractive errors, presbyopia and spectacle coverage: results from a rapid assessment of refractive error survey. *Ophthalmic epidemiology*, *16*(5), 269-274.
18. Dandona, R., Dandona, L., Naduvilath, T. J., McCarty, C. A., & Rao, G. N. (2000). Utilisation of eyecare services in an urban population in southern India: the Andhra Pradesh eye disease study. *British Journal of Ophthalmology*, *84*(1), 22-27.
19. Kumar, A., Agarwal, D., & Kumar, A. (2021). Diabetic retinopathy screening and management in India: Challenges and possible solutions. *Indian Journal of Ophthalmology*, *69*(3), 479-481.
20. Rahi, J. S., Sripathi, S., Gilbert, C. E., & Foster, A. (1995). Childhood blindness in India: causes in 1318 blind school students in nine states. *Eye*, *9*(5), 545-550.
21. Singh, S., Pardhan, S., Kulothungan, V., Swaminathan, G., Ravichandran, J. S., Ganesan, S., & Raman, R. (2019). The prevalence and risk factors for cataract in rural and urban India. *Indian journal of ophthalmology*, *67*(4), 477-483.
22. Neena, J., Rachel, J., Praveen, V., Murthy, G. V., & RAAB India Study Group. (2008). Rapid assessment of avoidable blindness in India. *PloS one*, *3*(8), e2867.
23. Marmamula, S., Khanna, R. C., Shekhar, K., & Rao, G. N. (2014). A population-based cross-sectional study of barriers to uptake of eye care services in South India: the Rapid Assessment of Visual Impairment (RAVI) project. *BMJ open*, *4*(6), e005125.
24. Jayaraman, R., Ray, D., & Wang, S. Y. (2013). Gender differentials in eye care: Access and treatment.
25. Seelam, B. (2021). *Implementation of a large-scale school eye health program for Indian children* (Doctoral dissertation, University of New South Wales (Australia)).
26. Mishra, L., Bhatlawande, P., Jotkar, R., & Bhagoorkar, P. (1996). Review of cataract intervention in Maharashtra State. *Ophthalmic Epidemiology*, *3*(1), 3-11.
27. Joshi, R. S. (2013). Causes of visual handicap amongst patients attending outpatient department of a medical college for visual handicap certification in central India. *Journal of Clinical Ophthalmology and Research*, *1*(1), 17-19.
28. Census of India. (2011). *Data on Disability – Table C-20.* Office of the Registrar General & Census Commissioner, India.
29. Whitcher, J. P., Srinivasan, M., & Upadhyay, M. P. (2001). Corneal blindness: a global perspective. Bulletin of the world health organization, 79(3), 214-221.
30. Sangeetha, S. (2025). Reaching the margins: Assessing social welfare scheme awareness and accessibility for unorganised workers in Tamil Nadu.
31. Welp, A., Woodbury, R. B., McCoy, M. A., & Teutsch, S. M. (Eds.). (2017). Making eye health a population health imperative: vision for tomorrow.
32. Senjam, S. S., Manna, S., Kishore, J., Kumar, A., Kumar, R., Vashist, P., & Kamath, R. (2023). Assistive technology usage, unmet needs and barriers to access: a sub-population-based study in India. *The Lancet Regional Health-Southeast Asia*, *15*.
33. Senjam, S. S., & Mannan, H. (2023). Assistive technology: The current perspective in India. *Indian Journal of Ophthalmology*, *71*(5), 1804-1809.
34. Math, S. B., Gowda, G. S., Basavaraju, V., Manjunatha, N., Kumar, C. N., Philip, S., & Gowda, M. (2019). The rights of persons with disability act, 2016: Challenges and opportunities. *Indian journal of psychiatry*, *61*(Suplpl 4), S809-S815.
35. Joshi, B., & Thomas, B. (2019). Barriers faced by persons with disabilities in formal employment in India. *Disability, CBR & Inclusive Development*, *30*(3), 125-132.
36. WHO & The World Bank. (2011). World Report on Disability. Geneva: World Health Organization.

37. Sarabandi, A., Vatankhah, S., Kamali, M., & Aryankhesal, A. (2021). Essential components of rehabilitation services provided to visually impaired people. *Clinical and Experimental Optometry*, *104*(2), 215-221.