EYE HEALTH FOR ALL

The Eye Health Pyramid

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It is said that India lives in many centuries all at the same time. This is true in matters of health as well; India is home to both cutting-edge health solutions and transgenerational deprivation. One of the biggest challenges of our times is collapsing these disparities and ensuring access to good quality and reliable health services for all. The lack of access to such care is a key impediment to our collective well-being and prosperity. We will fall far short of the Sustainable Development Goals (SDGs)—or any such future global promise—if we do not tackle the fundamental issue of affordability and access. Vision impairment, and the lack of access to good-quality eye care, mirrors this reality. India has a rich history of tackling blindness and vision impairment, including robust responses from the government and civil society. We have multiple delivery models, ranging from government-funded, charitable and cross-subsidised eye care that have brought good-quality eye care to our populations. Among the models available, an integrated pyramidal model of eye care service delivery has brought full-fledged, high-quality, cross-subsidised eye care services to over 34 million people in southern and eastern India. This eye health pyramid restores dignity to individuals, including women, and to their communities. It builds local health facilities that foster trust. It presents a model to tackle fundamental issues of access and offers us a path towards eliminating them. While the model is rooted in addressing vision impairment, it can build bridges to allied health sectors, and to share experiences with other health systems.

Vision loss can be characterised as two sets of issues: blindness and vision impairment. Vision impairment is a measure of visual

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acuity in both eyes at a distance. Our ability to see clearly is marked over a series of distances, and after a point when only bare light is perceived, a person is termed blind (these distances are marked on a scale of diminishing distance in the International Classification of Diseases). About a quarter of the Indian population aged 50 and older has vision impairment—an overwhelming majority of it is avoidable (Vashist, et al., 2022). The primary cause of severe vision impairment and blindness is cataract, a condition caused by a clouding of the eye's lens. Another ballooning cause for vision impairment is 'refractive error', or the mismatch between the length of the eyeball and its ability to refract light. At least 2.2 billion people are living with blindness or vision impairment, and 1 billion of these have a condition that could have been prevented or has yet to be addressed (Bourne, et al., 2021). Fortunately, over 80 per cent of vision loss can be addressed using simple, cost-effective interventions such as spectacles and cataract surgery (Steinmetz, et al., 2021). Vision loss profoundly impacts the social and economic well-being of individuals and families (Nutheti, et al., 2006; Mannava, et al., 2022). Eight of 17 SDGs, including poverty reduction, improved productivity, better education and equitable access to health care, are impacted by vision (Burton, et al., 2021). Therefore, one of the pivots for ensuring the success of the SDGs agenda is tackling vision loss. Key to reducing the burden of vision loss, however, is taking it closer to the people and addressing the physical and financial barriers to access.

The World Health Organization (WHO) defines Universal Eye Health (UEH) as 'ensuring that all people have access to needed promotive, preventive, curative and rehabilitative eye health services, of sufficient quality to be effective, while also ensuring that people do not suffer financial hardship when paying for these services'.[1] This approach insists on continuity of care with accountability and seeks to empower individuals to take responsibility for their eye care. The L. V. Prasad Eye Institute's (LVPEI) pyramidal network of eye health manifests this aspiration (Rao, et al., 2012). This model is widely replicated and has had a positive impact in addressing needless vision loss.

HISTORY AND EVOLUTION

Historically, stretching back to the colonial era, India's eye care 'sector' employed itinerant 'eye camps' to provide cataract surgeries

in India. These camps would be set up in a village and cataract surgeries were conducted right there in large numbers. By the early 1980s, it was estimated that India had as many as 3 million new cataract-blind every year (Sommer, 2012). Along with the existing burden, this was a staggeringly large number. There were not enough surgeons, not enough equipment, and the dominant surgery in those days—aphakic surgery—had not changed much in terms of visual outcomes in decades of practice (ibid.).

Thankfully, the seeds of change had been planted with the establishment of the National Programme for the Control of Blindness (NPCB) in 1976, with an almost exclusive focus on cataract. The programme, one of the first in the world, worked with WHO to put together a programmatic approach to tackle vision loss. By the late 1980s, aphakic surgery, where the clouded cataract lens is removed and the patient is sent away with a thick pair of glasses ('coke bottle glasses'), started to fall out of favour. A new kind of surgery, where the clouded lens is replaced by an intraocular lens (IOL), began to take hold.

The year 1976 also saw the establishment of a new kind of eye hospital system, a civil society-supported one, in Madurai: the Aravind Eye Hospital (AEH).[2] By the 1980s, AEH had made a name for its high-volume approach to cataract blindness. Towards the end of that decade, AEH, along with partners in India, Nepal and the United States, was one of the first to develop an IOL that was 2 per cent the prevailing price (Sommer, 2012). This revolutionised access to high-quality surgical outcomes, even for people who could not afford to pay for surgery. AEH pioneered and spearheaded the high-volume high-efficiency approach to tackle cataract blindness. Their efficiencies of practice across a growing network of hospitals in Tamil Nadu established the template to manage the prevalence in our population (Sommer, 2012; Natchiar, et al., 1994).

A World Bank-funded project to tackle cataract blindness in seven populous states of India became a watershed effort during 1994–2001. By the late 1990s, population-based studies began to reveal that eye camps reported poor visual outcomes after surgery, including high post-operative complication rates and poor follow-up rates (Bachani et al., 1999; Anand, et al., 2000; Dandona, et al., 2003). This growing consensus led to a general discontinuation of 'camp-based' cataract surgeries by key players in India's public

health eye care sector. Thanks to AEH (now the Aravind Eye Care System, or AECS) and hospitals such as the Sankara Nethralaya, Sadguru Netra Chikitsalaya, Shroff Eye Hospital among others, civil society institutions stood as tall as government-run apex institutions. The sector now included the state and central governments and their health institutions, along with the NGO/trust/philanthropic hospital networks that continue to deliver about half of eye care in the country. By the turn of the millennium, all these players came together to form VISION 2020: The Right to Sight India, a national forum to work together to tackle sight loss in all its complexity.[3]

VISION LOSS IN INDIA

A large, population-based epidemiological study, popularly known as The Andhra Pradesh Eye Disease Study (APEDS), during 1996–2000 (Dandona, et al., 1997), provided rich data and a deep understanding of the causes, prevalence and incidence of eye conditions in the united state of Andhra Pradesh. The study found that 2 per cent of the population had bilateral blindness and over 8 per cent bilateral moderate visual impairment. Both blindness and moderate visual impairment were higher in rural areas among women and the elderly (Dandona, et al., 2001; 2002). Most eye care programme activity of that era focused on cataract, but APEDS highlighted uncorrected refractive errors (the need for glasses) as the second leading cause of blindness after cataract and a leading cause of moderate visual impairment. Crucially, over a third of the eyes operated for cataract were blind even *after* surgery. This was a damning failure of the 'camp' approach to addressing vision loss on account of cataract (Dandona, et al., 2003). It was clear, then, that the path forward had to be comprehensive—addressing cataract alone, in temporary camps, would be sub-optimal (Dandona, 2000).

The APEDS data reflected the overall burden of vision loss in India. When NPCB began to track blindness prevalence in India in 1976, it was estimated that it was around 1.38 per cent of the population. Over time, with refined definitions and vast networks of care, blindness prevalence was estimated at 0.68 per cent of the population (2010) and is now at 0.36 per cent (Vashist, et al., 2022). This spectacular success is one more feather in the cap of India's public health systems. A joint strategy, where the Indian government's

health system along with civil society organisations have chipped away at three fundamental issues, identified as part of their formal approach: disease control, training adequate human resources (not just doctors, but other health personnel too) and building infrastructure. Problems, however, remain. The quality of eye health infrastructure is uneven across the country. We are still under-resourced for the populations we serve. Just as importantly, the nature of vision loss is changing. Preterm babies under the care of a growing network of NICUs are at risk of a blinding condition called Retinopathy of Prematurity. Myopia is set to explode among school-going children, while the older generations are at risk of diabetes-related eye disease and other conditions. Along with affordability, the fundamental issue that runs through these challenges is access.

THE PATH AHEAD: MANY MODELS OF EYE CARE

Government schemes like Ayshuman Bharat, which provide health insurance cover for eye conditions, is one primary means of addressing eye care accessibility. The NPCB works with state and district health officials to reimburse civil society hospitals for cataract surgeries conducted—and we conduct close 6.5 million cataract surgeries every year (Kumar and Vashist, 2020). Many large eye care organisations including AECS, Sankara Netralaya, M. M. Joshi Eye Institute and Sadguru Netra Chikitsalaya conduct large screening camps to identify those with eye conditions and refer them to 'base' hospitals. At the turn of the millennium, AECS assessed the outcomes of running screening camps and found that merely 7 per cent of those in need were identified by eye camps (Fletcher, et al., 1999). Clearly, a new model was necessary.

The LVPEI started as an advanced tertiary centre in Hyderabad (now in Telangana) in 1986. Its story is a key component of the innovation in Indian civil society to tackle sight loss. It offered the full spectrum of eye care—from simple spectacles to complex surgeries—often at no cost to the recipient. To enable this vision, LVPEI's first key innovation was a cross-subsidy model that spread the cost of free service across its paying clientele. By its first decade, it became apparent that most people had to travel long distances to access LVPEI's services. Consequently, despite LVPEI's offer of high-quality care at no cost, many people living in remote rural areas found travel to Hyderabad expensive and prohibitive.

LVPEI's response was a second key innovation: a multi-tier, pyramidal model of eye care service delivery. At the very base of this pyramid, 'vision guardians' service communities of up to 5,000 people. Vision guardians are part of the communities they operate in (like ASHA workers), and work to create awareness or assist with school and community vision screenings as well as to ensure follow-up care.

Vision guardians support and work with over 200 'Vision Centres' that offer primary eye care services, including the provision of spectacles. Each of these centres caters to the eye care needs of about 50,000 people (Rao, et al., 2012). Each vision centre is staffed by a trained 'vision technician' recruited from the local community. The centre is a free, walk-in primary health clinic well equipped to provide basic eye screening and refraction. A small optical outlet is an integral part of every vision centre, and the sale of spectacles to those who can afford them sustains these centres. At this scale, these centres offer local employment and entrepreneurship opportunities to youth in these villages. Many of the technicians are women who take great pride in going back to support the eye health needs of their communities.

Ten primary care vision centres link up and refer to the secondary centres, which serve populations of up to 0.5–1 million. They act as nodal points for all primary and community eye care. Vision centres identify and refer those who need basic clinical interventions or surgeries to secondary centres. Today, some of the secondary centres even offer complex surgical procedures like corneal transplants in semi-rural and peri-urban settings. In the context of eye care, this is a remarkable outcome as corneal transplants are advanced surgical procedures. In fact, many apex ophthalmic institutions across the world struggle with long waitlists for donor corneas.

These three levels at the bottom of the model comprising secondary and primary eye care facilities can address over 90 per cent of vision loss in India. Tertiary and quaternary care institutions constitute the top. They support training, basic science research and other complex institutional facilities like eye banks. The pyramid is undergirded by other specialist services, including rehabilitation facilities for those who are irreversibly blind. Tele-ophthalmology collapses the time needed to refer patients up the pyramid, saving time and travel costs and improves compliance.

The LVPEI is today a network of 265 (and growing) centres of eye care delivery in four states of southeastern India: Telangana, Andhra Pradesh, Orissa and Karnataka. The original campus in Hyderabad is a 'centre of excellence' and is complemented by three tertiary care centres in two different Indian states. All the four centres offer comprehensive, subspeciality eye care. Each of these centres is connected to 26 secondary eye care facilities (including four urban centres) spread across the rural and peri-urban locations of the four states. These secondary centres seed and support 235 primary eye care centres in rural and peri-urban locations.

The pyramid services about 2 million people every year. LVPEI conducts 150,000 surgeries, and supports around 19,000 individuals with low vision or blindness. It also conducts nearly 100,000 teleconsultations and trains close to 20,000 eye care personnel. The LVPEI eye health pyramid impacts the lives of 150 million people in India.

HIGHLIGHTS OF THE MODEL

The eye care pyramid recognises that health care provision is an ongoing activity and patients ought to be able to seek care when they want it—not when camps roll in. Its nodes are the permanent centres of care that engender health-seeking behaviour in the people they serve by building trust. Primary and secondary centres are built with local funding and support in addition to support from international agencies, and employ local youth, especially women. These centres are an integral part of their communities and are therefore patronised by them.

The eye health pyramid is now implemented by a variety of eye care organisations and networks and has been endorsed by WHO as well. For example, AECS runs 80 vision centres that use tele-ophthalmology to connect with seven tertiary hospitals, providing permanent centres of care in those rural locations in Tamil Nadu (Namperumalsamy, 2020). The pyramid's broad and universal approach opens it up even for the many small, vulnerable communities that are masked by large clusters: women, people with disabilities, the elderly, the new-born, tribal communities—many of them with a greater burden of vision impairment because of social factors. Take the elderly. As global birth rates stabilise and shrink by 2050, people over 65 will be nearly 16 per cent of the world's

population. India will be home to 1.7 billion people, including a large elderly sub-population. Our approach to elderly care needs to be long term, comprehensive and integrated, and must be oriented towards primary care to take it deep into communities. The pyramid model is uniquely positioned to help navigate the transition to an ageing society.

Mudhole, in Telangana's Adilabad district was once one of India's '250 backward districts'. With the Bhosle Gopal Rao Patil secondary eye centre, Mudhole became the home for LVPEI's first foray into the pyramid 25 years ago. Since its inception, blindness and vision impairment in the population serviced by this centre came down by 26 per cent. It was the first secondary centre to host corneal transplants in the LVPEI network—and perhaps, the first rural location anywhere in the world to do so. The primary cause of blindness and vision impairment in Mudhole's catchment is cataract. In these 25 years, the effective cataract surgical coverage rate (eCSC) went up from 10 per cent to 45 per cent. A good proxy for both health availability and its quality, eCSC indicates the availability of cataract coverage and measures it over quality-of-care. This makes it a candidate indicator for measuring universal health coverage (UHC), a key WHO health target for achieving the SDGs.

WAY FORWARD

The pyramid model demonstrates that sustainable and comprehensive eye care services can reach those who need it the most. With decades of engagement and trust behind it, the pyramid can act as a point of entry for a set of allied health services such as screening for diabetes, hypertension, even depression and mental health. Several components of this model can be emulated by other health services to ensure uptake. Together, we can work to build resilient health systems for India that can address a variety of changes: an aging population, changing lifestyles, increasing urbanisation, and more.

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NOTES

1. World Health Organization (WHO). 2013. 'Universal Eye Health: A Global Action Plan, 2014–2019', p. 28.

2. Aravind Care Eye Care System. https://aravind.org/our-story/. Accessed on 4 December 2022.
3. https://www.vision2020india.org/about-us/origin/. Accessed on 4 December 2022.

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