WORLDWIDE: Magnitude and Prevalence

The definitions for visual impairment, low vision and blindness follow those given in the International statistical classification of diseases, injuries and causes of death, 10th revision (ICD-10): H54 (9) where: visual impairment includes low vision as well as blindness; low vision is defined as visual acuity of less than 6/18, but equal to or better than 3/60, or a corresponding visual field loss to less than 20 degrees in the better eye with best possible correction (ICD-10 visual impairment categories 1 and 2); and blindness is defined as visual acuity of less than 3/60, or a corresponding visual field loss to less than 10 degrees in the better eye with best possible correction (ICD-10 visual impairment categories 3, 4 and 5).

The number of people with visual impairment worldwide in 2002 was in excess of 161 million, of whom about 37 million were blind and 124 million had low vision. However, cataract remains the leading cause of blindness and visual impairment in all regions of the world, except in the most developed countries.

The burden of visual impairment is not distributed uniformly throughout the world: the least developed regions carry the largest share. Visual impairment is also unequally distributed across age groups, being largely confined to adults 50 years of age and older. A distribution imbalance is also found with regard to gender throughout the world: females have a significantly higher risk of having visual impairment than males due to social and medical reasons.

Although childhood blindness remains a significant problem (there are an estimated 1.4 million blind children below the age of 15 years), its magnitude is relatively small when compared to the extent of blindness in older adults when considered as numbers; more than 82% of all blind people are 50 years and older. The number of women with visual impairment, as estimated from the available studies, is higher than that in men even after adjustment for age. Female/male prevalence ratios indicate that women are more likely to remain with a visual impairment than men in every region of the world: the ratios range from 1.5 to 2.2.

Despite these concerted efforts for prevention of blindness during the past 25 years, the number of blind persons in the SEA Region is still increasing. There are more blind people in the Region (15 million – using the WHO definition) in the new millennium than there were in 1975 (7 million). It is estimated that this number will double before we approach the first quarter of the next century. The reasons for this are the rapid increase in the total population as well as ageing population. The other reason for this increase is the low priority, therefore, poor financial allocations that blindness prevention programs have received in the past in the countries of the Region. All this requires a change in focus.

A global initiative was launched by the name of **'Vision 2020: The right to sight'd** on February 18, 1999 by the World Health Organization (WHO) and the International Agency for Prevention of Blindness (IAPB) for elimination of the avoidable blindness by the year 2020 by means of global co-operation and collaborative approach, which involves WHO, IAPB, International non-governmental organizations like

Sightsavers and CBM being founding members, philanthropic institutions and other organizations and individuals working with National Governments. Globally 'Vision 2020' aims at 20 million cataract surgeries annually by the year 2010 and 32 million cataract surgeries annually by the year 2020.
Given the population in 2000, the regional figures implied a global prevalence of blindness of 0.72%. The global prevalence of blindness in 2020 was projected to increase to just over 1% (75.9 million blind persons). The prevalence increased most rapidly in regions predicted to have a significant demographic transition over the next 20 years. This excluded the established market economies and former socialist economies, where the demographic transition has already occurred and sub-Saharan Africa, where the demographic transition has not been projected to occur through 2020. If VISION 2020 were as successful as projected, the global prevalence of blindness would decrease to 0.33% in 2020. Under these projections, the number of blind persons decreased to 24.4 million in 2020 despite world population growth. The number of cases in the population aged 15 to 64 years increased from 25 million in the year 2000 to 33 and 43 million in 2010 and 2020, respectively without VISION 2020 but decreased to 23 and 13 million in 2010 and 2020 with VISION 2020.

WHO South East Asia Regional Perspective

Magnitude and Prevalence

One third of the world's 37 million blind and half of the 1.4 million blind children in the world live in the South East Asian region. Of the 12 people who become blind every minute in the world, 4 are from South East Asia. With one quarter of global population and one third of the world's blind, South East Asia has an enormous burden of blindness. The blind persons in this region are among the poorest in the world and from the lower strata of society, most of them women. There are another 38 million people in this region with low vision, and the region is estimated to have 50 million Visually Impaired Persons (VIPs).

The prevalence of blindness in the Region is around 0.8%. The rates vary from 0.3% for Thailand to 1.5% for Indonesia. The blindness prevalence rate for Thailand is comparable to developed countries and is a reflection of the outstanding achievement of the Thai National Program for Prevention of Blindness. The highest blindness prevalence rate of 1.5% reported from Indonesia is comparable to sub-Saharan Africa. The prevalence of blindness varies not only between countries but also within the countries. Cataract is the single most common cause of blindness in the countries of the Region, being responsible for 50% to 80%. Other important causes include uncorrected refractive errors, trachoma, childhood blindness, glaucoma, corneal ulcer, ocular trauma, diabetic retinopathy, and age-related macular degeneration. In 1981, a national program for the prevention and control of blindness was launched in Nepal. The program was preceded by a national epidemiological survey to determine the magnitude, causes, and regional distribution of blindness. The survey reported 0.84% of the population to be blind using the best corrected visual acuity (VA) cut-off of 3/60. In the year 2002 alone, Nepal performed 111 740 cataract surgeries (Annual Report 2002, Nepal Netra Jyoti Sangh). As per a very recent survey, there are an estimated 650 000 blind adults aged 30 and over in Bangladesh, the large majority of whom are suffering from operable cataract. The problem of childhood blindness in Bangladesh as per recent studies and supported by key informant interviews have also shown to be 0.6-1.0/1000 children.

Blindness is estimated to cost the countries of South East Asia US$ 5.6 billion annually, in lost productivity, education and rehabilitation. Additionally, the life expectancy of blind persons is one third less than their sighted peers.

On the above background, South East Asia Region ‘Vision 2020: The Right To Sight’, was launched on 30 September 1999 to eliminate avoidable blindness from the Region. The significance of this initiative is the introduction of the concept of sight as human right - recognition of sight as a fundamental human right by all countries can be an important catalyst of initiatives for prevention and control of blindness. This

initiative is likely to decrease the number of blind population to 8 million by the year 2020. Various international NGOs working under the auspices of the International Agency for the Prevention of Blindness (IAPB) and collaborating with WHO is spending over US$ 80 million per year in support of national eye care programs. A substantial part of this funding goes to South-East Asia, where collaborating national NGOs are also making significant contributions to the activities undertaken at the local level.

Major Causes of Blindness in South East Asia

Cataract

Quality of visual outcomes and low surgical output of cataract in some defined geographical areas remains the most critical issue in the region at present. There is an estimated un-operated cataract backlog of about 10-12 million blind persons, which is increasing very rapidly. The cataract surgical rate varies from a low average of 350/million population/year in Indonesia to 4800/million population/year in India. Intraocular lens implantation rates are increasing and vary from a low 20% of all cataract surgeries in Indonesia to 90% in India and close to 100% in Bhutan and Sri Lanka. However, the visual outcome of cataract surgery is still poor in one – fourth to one-third of the operated cases, and this poor outcome is often a barrier to uptake of surgery by prospective clients as has been highlighted by rapid assessment studies and the national survey of blindness and visual outcomes in 2002.

Trachoma

Trachoma is currently confined to pockets of blinding disease in some South Asian countries. Large-scale control efforts since the 1950s, initiated through WHO with country support also through UNICEF, has led to a considerable reduction of the toll of blindness from trachoma. Today, the disease in its severe blinding form is limited mainly to Myanmar and Nepal, affecting certain population groups of low living standards. The present estimate (WHO-SEAR 2000) indicates that there are some 660,000 cases of active disease in need of treatment in those countries. Endemic trachoma in some pockets along the Himalayas and certain northern states in India has been reported recently but blinding trachoma is not a cause for concern.

Childhood Blindness

The leading causes of childhood blindness in the Region are xerophthalmia, congenital cataracts, globe anomalies, hereditary causes, congenital glaucoma, optic atrophy due to meningitis, retinopathy of prematurity, and uncorrected refractive errors. While blinding xerophthalmia is largely under control with vitamin A distribution in many countries, strategies to provide a long-term solution, including promotion of consumption of vitamin A-rich food, are needed. The inclusion of rubella vaccination in the general program for immunization in the countries may go a long way in preventing rubella cataracts, an important cause of childhood blindness.

Glaucoma

Glaucoma is a chronic, progressive disease of the optic nerve that affects approximately 70 million people around the world. It is the second most common cause of blindness and there are an estimated 7.5 million blind from the glaucoma, worldwide. It is most common cause for irreversible (permanent) blindness in the world including our India. In India, there are at least 12 million people affected with the glaucoma, 1.5 million are blind. The disease is more common in old age. The occurrence of glaucoma increases as age increases, approximately 2 – 3 persons per hundred persons are affected above the age 40 years; this increases to nearly 5-7 persons per hundred persons in 60-year age group. It is surprising to see that more than 90% of people are unaware of the glaucoma when first diagnosed even in urban area of metro cities.

Others

Uncorrected refractive error is now recognized to be an important cause of visual impairment and blindness in the Region. Present estimates indicate significant variations in the prevalence of visually disabling refractive errors; thus the above-mentioned population-based study in children revealed a prevalence of 2.9% in Nepal, 4% in India, but as much as 12.8% in China. In addition, there are an estimated 3-4 million persons blind due to corneal opacity (1999). While trachoma and xerophthalmia were the main causes in the past, the consequences of ocular trauma and corneal ulceration are now emerging as important causes of corneal blindness. According to some estimates, 6.5 million people suffer from ocular trauma, and 1.3 million eyes become blind from corneal ulcers every year in the Region.

Eye Care Scenario in India

3.1 Magnitude and Prevalence of Blindness

India houses highest percentage of cataract population of the world as well as high cataract prevalence rate. It was estimated that in India 3.8 million people become blind from cataract each year in the early nineties. Blindness in India is known to increase rapidly after 50 years of age. Nearly half of the world's micronutrient deficient people may be found in India. For example, of the 20-40 million children worldwide who are estimated to have at least mild vitamin A deficiency (VAD), half reside in India. VAD causes an estimated 60,000 children in India to go blind each year. As per the National Survey records, the States like Madhya Pradesh, Rajasthan and Jammu & Kashmir have high blindness prevalence (2% and above). The prevalence of blindness is higher among population having lower socio-economic status. Females are found to have a higher preponderance of blindness as compared to males. The prevalence is significantly higher in rural and backward areas.

Prevalence of Blindness (Visual Acuity <6/60) as per the National Survey (86-89)k

Category

Prevalence (%) **States & regions of the country**

Prevalence of Blindness (Visual Acuity <6/60) as per the National Survey (86-89)[k]

Category	Prevalence (%)	States & regions of the country
Low Prevalence	< 1	Punjab, Himachal Pradesh, Delhi, West Bengal, & N.E. States
Moderate Prevalence	1 to 1.49	Gujarat, Haryana, Kerala, Bihar, Karnataka, Andhra Pradesh and Assam
High Prevalence	1.5 to 1.99	Maharashtra, Orissa, Tamil Nadu & Uttar Pradesh
Very High Prevalence	2 and above	Madhya Pradesh, Rajasthan and Jammu & Kashmir

A World Bank Assisted Cataract Blindness Control Project was launched in 7 states over 7 years in 1994 to help improve the National Program for the Control of Blindness' (NPCB's) quality of service and expand its treatment capacity by: (a) enhancing quality of care and expanding service delivery through new strategies, policies, technical and operational norms; increased use of modern surgical techniques; and expanded coverage of rural and isolated populations with extensive Non Governmental Organization (NGO) and private sector involvement; (b) developing human resources for eye care delivery by strengthening selected training institutions, upgrading the skills of ophthalmic and health personnel, and providing management training for Central, State and District project managers; (c) promoting outreach activities and public awareness by supporting NGO's and community involvement,

and raising awareness about cataract blindness through mass and traditional folk media, and interpersonal communications; and (d) developing institutional capacity at the Central, State and District levels, developing collaborative mechanisms with the non-government sectors, introducing measurable monitoring mechanisms, and conducting operations research. The 7 states happened to be states with the highest prevalence of cataract blindness as per the 86-89 except the State of Jammu and Kashmir for political unrest reasons.

Main Causes of Blindness in this population are as follows

A	Cataract	62.6%
B	Refractive Error	19.70%
C	Corneal Blindness	0.90%
D	Glaucoma	5.80%
E	Surgical Complication	1.20%
F	Posterior Capsular Opacification	0.90%
G	Posterior Segment Disorder	4.70%
H	Others	4.19%

3.2 Interventions

India has developed a strong infrastructure for eye-care. The country presently has about 120,000 health Sub-centers manned by two health workers (for every 6000 population), 22,000 Primary health centers with a doctor and other paramedical staff (for every 40,000 population), 6000 Community health centers/first level Referral centers (for every 120,000 population) and over 500 District and subdistrict hospitals. Health services in India are available in both the public and private sector, the latter absorbing about 75% of all health expenditure, public and private.

India, the second most populous country in the world, is home to 23.5% of the world's blind population. In 1976 India became the first country in the world to start a national program for control of blindness. All surveys in the country have shown that cataract is the most common cause of blindness and all prevention of blindness programs have been "cataract-oriented." However, it has recently been recognized that the visual outcome of the cataract surgeries as well as the training of ophthalmologists has been less than ideal. There is now increasing emphasis on high-quality surgery and up-gradation of skills among ophthalmologists. Other important causes of blindness are refractive errors, childhood blindness, corneal blindness, and glaucoma that need to be addressed.

Prevention and control of blindness is one of the India’s compelling development challenges.

Recognizing the massive scale of blinding situation, Government of India launched the National Program for Control of Blindness (NPCB), with a goal of reducing the prevalence of blindness. Over the time, various multilateral and bilateral development agencies such as WHO, World Bank, Danida, DFID and international NGOs such as CBM, ORBIS International, Sightsavers International, OEU, Lion's International have extended adequate support to strengthen the blindness prevention initiatives. The national program developments in India for the prevention and control of blindness have served as a blueprint for many other countries.

National Program for the Control of Blindness (NPCB)

NPCB was launched in the year 1976 as a 100 percent centrally sponsored program. That program was declared a national priority by the late Prime Minister H. E. Indira Gandhi in the 1980s, particularly for a focus on cataract and childhood blindness. Various activities of the program include establishment of Regional Institute of Ophthalmology, upgradation of medical colleges and district hospitals and block level Primary Health Centers, development of mobile units, and recruitment of required ophthalmic manpower in eye care units for provision of various ophthalmic services. The goal was to reduce the prevalence of blindness from 1.4% to 0.3% by 2000 A.D.

India Vision 2020 plans

The overall objective of Global Vision 2020 is to assist Member Countries in building their national capacity for prevention and control of blindness, specifically to assist them to eliminate avoidable blindness from major causes (cataract, xerophthalmia and other causes of childhood blindness, refractive errors and low vision, trachoma and other causes of corneal blindness) by the year 2020.

This global initiative requires that each member country develops a national plan and strategy to achieve the goals of the plan. **Vision 2020: The Right to Sight** was launched in India on October 10-13, 2001 at Goa. The following will be the priorities for the country

I. Disease Control includes Cataract, Diabetic Retinopathy, Glaucoma, Corneal Infections, Childhood Blindness and Refractive Errors & Low Vision

II. Human Resource Development

III. Infrastructure – Eye Care Facilities

IV. Technologies, Supplies & Eye Care Delivery Systems

V. Strategies for Effective Implementation that includes Situation Analysis, Structure, Coordination amongst all providers, Monitoring and Information Systems will be pursued

Disease Control Status

Cataract

Cataract continues to be the major cause of blindness. However the strong focus under the NPCB on cataract seems to have made significant impact. The cataract surgical rate quadrupled within a span of 12-13 years to 4,800catops/per year/million. Some of the recent surveys showed that cataract as a cause of blindness is now less than 65% level as opposed to 80% level in the survey done in the mid 80's. The proportion of IOL surgery has increased to about 90% across the country.

Cornea

The main area of concern is corneal infections arising out of trauma or other infectious reasons. Hospital corneal retrieval for eye donation has seen good growth over the last few years.

Childhood blindness

Childhood Blindness is an important public health problem in developing countries due to its social and economic implications. Though prevalence of childhood blindness is comparatively low as compared to blindness in the aged, it assumes significance due to large number of disability years of every child remaining blind. Recent studies in India indicate that refractive errors were responsible for visual impairment in more than 80% affected children.
This is an area, which has not developed well in India. Only in the last few years few centers in the country that offer both the services to children as well as training to ophthalmologists in this discipline have been developed. Constraints for developing services under childhood blindness include:

- National programme for control of blindness, Prevention and control of childhood blindness in India, Plan of action: 2002-2007, Ophthalmology/blindness control section, Ministry of health & family welfare , Nirman bhavan, New Delhi

Refractive Errors and Low Vision

Refractive errors, though very simple condition to rectify, has not had sufficient importance till now. Some of the recent studies are started showing that 60–70% of the vision impairment can be addressed by providing glasses. Children between 10-15 years and adults over the age of 40+

as well as those who have had cataract surgery are the principal target groups for service provision. Formal human resources that were available to correct refractive errors was about 15/ 2 million population (0.77/100,000 people) and there is misdistribution of resources of these. The National Plan of Action under the NPCB for the period 2002-2007 set out the following objectives for refractive errors:

• To provide eye glasses to about 1.5 million children having significant refractive errors assuming that at least 5% of children below 15 years of age will need glasses to correct their refractive errors. This translates for the Xth Plan (2002-2007) to free glasses for 10% children with refractive errors, which is to cater to 1.5 million children. The average cost of a pair of glasses is estimated to be Rs. 150/-. *(USD 3.5)*

• Besides school eye screening Program that is undertaken under National Program for Control of Blindness, PHCs and NGOs should be involved in community based refraction services.

• There should be mechanisms to identify refractive errors is out-of-school children also.

• Dilatation of pupils should be must before confirmation of refractive errors as per the guidelines.

• Vision centers in rural areas at PHCs and NGO screening centers should be developed.

• Glasses should be distributed through the PHCs and where the PHC is not functioning, they could be distributed through the Panchayats

However, some of the challenges in this are trained human resources, availability of glasses and provision of services with accessibility, availability, acceptability and affordability. The potential for refractive services to subsidize eye care programs is yet to be utilized to its fullest possible extent.

Low Vision

Low vision is defined as permanent visual impairment that is not correctable with refractive error correction or surgical intervention. Those with best-corrected distance visual acuity <6/18 to perception of light or central visual field <10 degrees because of an untreatable cause in both eyes are considered as having low vision.

Significant barriers ranging from both the providers and beneficiary side exist with respect to low vision. There is a significant burden of low vision in this population, suggesting the need for low vision services.

There are few centers that provide low vision services in the country. The capacity is less than the potential demand.

Diabetic Retinopathy

The WHO has estimated that within the next three decades, India is likely to have a prevalence of diabetics at 6% of the rural population and as high as 15-20% in urban areas. It is estimated that 25% of these patients would have diabetic retinopathy and a significant proportion of this would require active treatment for this condition. This is an emerging problem and is likely to get compounded by changing life styles and ageing of the population. The need is to develop the capacity for treatment as well as mechanisms that can screen the diabetics at the first level and at the second level those who have developed diabetic retinopathy.

Glaucoma

The Glaucoma affects a significant number of people and is probably the leading cause of permanent blindness. However, as of date there are no reliable screening mechanisms that can be carried out in the community. The treatment regimen has also to be customized to each individual requiring a very high level of patient compliance. One of the immediate steps that can be taken is to ensure that all the eye care providers are encouraged to have in place a process to examine all the patients who come into the system (either in the hospital or in camps) for glaucoma and initiate necessary treatment. This can help prepare community to become more aware of the disease and the treatment options.

Human Resources in Eye Care

India has a CSR of 4,800 per million per year, one of the highest in the world, approximately 11,000 ophthalmic surgeons achieve this. Currently there are a variety of paramedical personnel in eye care. Some common categories include: paramedical ophthalmic assistants, opticians, ophthalmic nurses, refractionists, orthoptists, and ophthalmic technicians. The estimated number of personnel in these categories is about 15,000. However, another 15,000-20,000 persons are working in eye care facilities without acquiring any formal training or qualification.

Major Issues in Blindness Control in India

1. Generally program administration has been limited to allocating resources, providing some technical advice, setting targets and monitoring target achievement without strategic planning or monitoring systems to measure appropriate resource allocation and performance.

2.The NPCB has been unable to establish a coherent strategy to coordinate the efforts of the private, voluntary and public sectors involved in blindness control in India; as a result, coverage has been insufficient and erratic.

3. There is a lack of coordination between Service Providers. Government facilities, NGOs and Private sector are usually located in urban/peri-urban areas.

4. NPCB has focused primarily on increasing the number of cataract operations without assessing the quality of outcomes or patient satisfaction. To meet numerical targets, most unilateral cases are being operated on with the traditional ICCE technique, which is medically inadvisable and leads to patient dissatisfaction.

5. Poor quality outcomes are often the result of inadequate diagnosis, inappropriate surgical procedures and lack of patient follow up. While ICCE technique was the practice earlier for bilateral cases, given the conditions available in developing countries, competent screening and appropriate selection of surgical techniques are critical for achieving visual restoration. This is often not achieved due to lack of adequate diagnostic training, and inadequate post-surgical follow-up. Quality audits of the cataract surgical process is not the norm till about a few years ago.

6. Under-utilization of Existing Facilities. Despite the investments in infrastructure, equipment and manpower, many facilities remain underutilized for lack of materials and supplies required for service delivery.

7. Inappropriate distribution of human resource. Two thirds of the nation's ophthalmologists work in the private sector with a few working in remote areas. This disparity has led to significant differences in services offered/sought by the public.

7. Socio-cultural, Logistical and Financial Issues

Among rural populations, folk beliefs and practices play an important role in decisions to seek treatment. Generally people suffer from eye diseases, do not seek surgery for various social, cultural and psychological reasons such as fear of surgery, hospitals or travel, poor quality outcomes among relatives or neighbours, family obstacles, fatalistic beliefs, and reliance on outdated practices such as "couching," and folk medicine. Other major obstacles include: transportation costs, loss of wages as a result of accompanying family members for treatment, unauthorized fees at service facilities and other related expenses.

Eye Care in the Broader Health Agenda in India

India was the first country to have a National Program for Control of blindness anywhere in the world. A Resolution of the Central Council of Health & Family Welfare at its meeting in the year 1975 said that "One of the basic Human Right is to see and, therefore, it is to be ensured that no citizen goes blind needlessly; or being blind does not remain so, if, by reasonable deployment of skill and resources, his eye sight could be prevented from deteriorating and if already lost could be restored". It was launched in 1976 as a 100% centrally sponsored programme to reduce prevalence of blindness from 1.4% to 0.3%. The National strategy for Prevention and control of Blindness adopted which included:-

1. Dissemination of information about eye-care through mass communication.
2. Emphasis on ocular health among children and vulnerable sections of society
3. Augmentation of ophthalmic services so that relief can be given in the shortest possible time
4. Establishment of proper infrastructure for community eye health care

The NPCB also found mention in the National Health Policy in 1983 and has been successfully supported by the Central Government and resource allocations have been made as a priority in the country. Successively the program has also been able to get international NGO support and funding from the World Bank for a Cataract blindness control project. Facilities for Scheduled Castes and Tribes: National Programme on Control of Blindness was launched in the year 1976 with cent percent assistance for strengthening of ophthalmic infrastructure, training of personnel, etc. in tribal and SC areas for treatment of eye ailments and control of blindness under TSP and SCP. In addition, schemes for nonrecurring grant-in-aid to NGOs, for setting up or expansion of eye care units in tribal/remote areas, is being implemented to develop infrastructure for eye care in such areas. Special campaigns for identification and treatment of bilaterally blind persons due to cataract is undertaken in remote and underserved areas during mega eye camps. Under the revised strategy, coverage of eye care service in tribal and other underserved areas has been enhanced. Blindness control activities form an important strategy for action under the National Rural Health Mission with at least 4 indicators monitored at the level of the community namely Cataract surgery rate, no. of children with refractive errors provided with glasses, % utilization of donated eyes and No. of teachers trained in vision screening.