

## Vision 2020 and Prevention of Blindness: Is it Relevant or Achievable in the Modern Era?

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### Abstract

We are living in exciting times with many challenges and new opportunities to overcome diseases. The concept and definition of blindness and their major causes worldwide are discussed with reference to the Vision 2020 initiatives launched in 1999 for blindness prevention, with an updated summary. The peculiar problems that exist in Singapore are also presented. Yet, if the world's major causes of blindness: cataracts, onchocerciasis, trachoma, refractive errors and low vision, and childhood blindness (inherent problems of the Third and Fourth World) can be overcome with international concerted efforts by year 2020, there will emerge new causes as yet unknown. Noble as our aims may be to achieve short- and long-term targets, we have to face the continuous reality of our inability to fulfil them.

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**Key words:** IAPB, International NGO agencies, WHO, World causes of blindness

### Introduction

This review article considers the universal definition of blindness, the causes of world/global blindness, and ongoing international efforts in blindness prevention. The prospects for Vision 2020 – 20/20 or 6/6 visual acuity for all by year 2020 – worldwide, and for Singapore in particular, and whether it is relevant or achievable in the modern era, are discussed.

### World Health Organization (WHO) Definition

There is still no definition of blindness which is universally accepted. The 1965 International Classification of Diseases of the WHO includes blindness believed to be congenital, but excludes impaired vision due to refractive error.

Specifically defined, it refers to a central visual acuity of 3/60 or worse with the best correcting lens, or a field defect in which the field has contracted to such an extent that the widest diameter of visual fields subtends an angular distance no greater than 10 degrees around fixation or 20 degrees in diameter.<sup>1</sup>

Not specifically defined, it includes the less specific “economic blindness”, which means the inability to do any kind of work, industrial or otherwise, for which sight is essential. In more recent years, the WHO has adopted, for

easy compliance, a definition of best vision less than 3/60, or counting fingers at 3 metres.<sup>2,3</sup> The WHO has also in 2003 included monocular blindness in its ICD-10 coding in category H54 for blindness and low vision, although many countries today (including Singapore) do not register monocular blindness.<sup>4</sup>

### Global Blindness

Figures for the number of people blind from all causes worldwide are, at best, only an estimate. Accurate data are still unavailable, or unreliable, even in countries where blindness is registered.

It is estimated that the number of blind people in the world will increase by more than 1 million each year. In 2000, there were 45 million blind people and a further 135 million people with serious visual impairment.<sup>5</sup> The WHO and the International Agency for Prevention of Blindness (IAPB) have recommended that if urgent action is not taken, these numbers will double over the next 20 years. This is unacceptable from both a humanitarian and a socio-economic point of view.

The resources available are insufficient to tackle the problem, particularly in developing countries, where 9 out of 10 of the world's blind live. There is a lack of trained eye

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personnel, medicines, ophthalmic equipment, eye care facilities and patient referral systems.<sup>5</sup>

### Blindness in Asia

The WHO estimated that Asia alone holds 58% or 40 million, of the world's blind. It is estimated that another 20 million are severely visually impaired.

Mind-boggling as these figures may sound, the late Sir John Wilson, founder of the IAPB, who was himself blind, emphasised that people do not become blind by statistics, but as individuals.

With mass blindness at our doorstep, what is our realisation and what has been our participating role?

### Concept of World Blindness

Strictly speaking, the term "blindness" should be restricted to irreversible blindness. Visual impairment due to cataracts is readily reversible, given adequate surgical techniques and provided there is no other eye pathology.

But because cataract blindness has become the commonest cause of visual impairment worldwide (particularly in the Third World), the concept of blindness includes that caused by cataracts, globally.

### Major Global Blinding Conditions

These are cataracts, onchocerciasis, trachoma and xerophthalmia. Except for cataracts, which are age-related and multifactorial, the other blinding conditions are deprivation-related. Xerophthalmia is due to vitamin A deficiency, whereas trachoma and onchocerciasis are caused by specific infective agents, with underlying poor hygiene as a common denominator.

#### Cataracts

Cataracts are the example *par excellence*. A disease so commonplace, yet totally curable, cataracts have for a long time eluded public awareness as a leading cause of world blindness. Now, as a result of surveys of the blind population, cataracts have emerged as a top-ranking cause of world blindness. By 1999, 20 million people were estimated blind from cataracts worldwide. This figure is increasing rapidly due to population growth and ageing.<sup>6</sup> The sheer geographical scale and the lack of skilled manpower has created a "cataract back-log" in almost all regions of the developing world. As a global problem, there is universal agreement that screening has to be better and surgery, more cost-effective. All countries with a cataract backlog are in agreement that available surgical facilities are not utilised maximally, e.g., services in the field may not be utilised because of the hot season. There also appears to be a mismatch between manpower and demand – not merely is there an insufficient number of surgeons as a general rule,

but even when there are enough surgeons, they require incentives to perform free cataract surgery or to go into the rural areas.

Although 9 to 10 million cataract surgeries are performed annually, there is increasing evidence from various parts of the world that the visual outcome is unsatisfactory in a significant proportion of the cases. It is essential to improve the quality of visual outcome through careful preoperative case selection, good surgical technique, and adequate correction of refractive error after surgery. The quality of outcome can be improved by increasing the proportion of cataract surgery carried out in suitably-equipped permanent static eye centres. Further study is required to determine if outcome can be improved by small incision surgery using low-cost techniques.

In order to eliminate cataract blindness by the year 2020, it is estimated that the number of surgeries performed annually must rise at least three-fold. In many countries, there is a need to train more cataract surgeons in microsurgery and intraocular lens (IOL) implantation. The emphasis of training should be to achieve a high quality of visual outcome in the maximum number of patients.<sup>6</sup>

#### Onchocerciasis

Onchocerciasis is also called River Blindness where the vector blackfly breeds in the fast-flowing river basins in West and sub-Saharan Africa. Foci of infection also occur in Central and South America and in the Middle East. The parasite *Onchocerca volvulus* infects humans via the bite of the intermediate host, the simulium tze-tze blackfly. The filarial worm causes multiple organ disease, a shortened lifespan and blindness, when the dead worm which has migrated to the eye causes an intense inflammatory immune response of varying degrees that can destroy the whole eyeball and the optic nerve.<sup>7</sup>

By 1999, an estimated 18 million around the world were infected, with approximately 0.3 million blind.<sup>6</sup> Ivermectin, a product that has been used for many years to destroy worms in animals, has been found to be effective in eliminating the filarial worm and in sterilising the adult female fly. The Onchocerciasis Control Programme (OCP) in West Africa works through a combination of vector control and ivermectin distribution, with reported disease interruption and decline in prevalence rates. The African Programme for Onchocerciasis Control (APOC) works in Central and East Africa. There are similar programmes for the Americas. Following the formation of the APOC in 1995, the so-called community directed treatment with ivermectin (CDTI) became the chosen methodology for distributing ivermectin. The success of CDTI, supported by the pharmaceutical industry, non-governmental organisations (NGOs) [such as Sightsavers International

(SSI)] and others (World Bank), indicates that control of onchocerciasis as a public health problem is possible<sup>6</sup> but it is not realistic to expect complete eradication because the drug cannot break the transmission cycle. The vector has to be destroyed and more screening is required in endemic areas.

### *Trachoma*

Trachoma is an ancient disease still rampant in the Third World. Fifty years after the discovery of the infective chlamydia agents by Chinese scientists in 1954, an effective vaccine against trachoma has still to be found, despite intense research worldwide. Trachoma remains a major problem related to poor personal hygiene, sanitation and socio-economic changes, improvements of which are doubtful or difficult to come by in the poorer countries and remote regions.

By 1999, an estimated 11 million people had trichiasis, with 6 million visually handicapped or at immediate risk of blindness.<sup>6</sup> A new programme for the Global Elimination of Trachoma as a blinding disease by the year 2020 – GET 2020 – has been established. The strategy adopted for GET 2020 is known as SAFE. SAFE is a package with 4 components: surgery for trichiasis, antibiotics for active infection, facial cleanliness, and environmental improvement. The 4 elements of the SAFE package are expected to be implemented by the year 2020 in all countries in which trachoma is a blinding disease.

There is a need to increase the number of trichiasis surgeons. They should be adequately trained and equipped to deliver trichiasis surgery in the community.

Recent evidence suggests that community-based distribution of oral azithromycin is at least as effective as the use of tetracycline eye ointment and is considerably more convenient for community treatment.<sup>6</sup>

### *Xerophthalmia*

Xerophthalmia is a major cause of childhood blindness in large parts of Asia, Africa, Latin America and the Western Pacific. Children with xerophthalmia, caused by vitamin A deficiency, also risk dying. Their dietary deficiencies are exacerbated by childhood infections, particularly measles, diarrhoea and respiratory diseases. Lactating mothers are also at risk. Yet, xerophthalmia is completely preventable by supplying the child with vitamin A, preferably in fortified doses. In this regard, the Helen Keller International foundation has been particularly successful with the distribution of vitamin A in Indonesia and other Asian countries, where the scale of childhood blindness has been largely reduced. The education of mothers on the natural sources of vitamin A in green leafy vegetables is also an integral component of national programmes in countries where the disease is prevalent.

### *Refractive Errors and Low Vision*

Unrecognised and uncorrected refractive errors are increasingly common causes of visual impairment, even in the developed countries, where adequate screening for prevention of blindness (POB) are in place. This is not a pathological problem but needs awareness in the community that uncorrected refractive errors are not uncommon, requiring the services of refractionists and affordable spectacles. There are also a large number of people with low vision, many of whom would benefit from low-vision services.

### *Childhood Blindness*

There are 1.5 million blind children in the world, and about 500,000 children become blind every year. Childhood blindness is the second leading cause of blind-person-years.

The causes of blindness in children vary according to economic development. In low-income countries, the priorities for intervention are corneal scarring and cataract. In high-income countries, retinopathy of prematurity is more important. The major targets for Vision 2020 include the elimination of new cases of measles and congenital rubella syndrome, eradication of vitamin A deficiency, and inclusion of primary eye care into all primary healthcare programmes by 2010.<sup>6</sup>

### **Global Issue**

World blindness has become a global problem without a global solution. The task of eradication is difficult and is different in the various countries of the developing world. Each country has its own problem requiring its own specific solutions. There are numerous organisations which recognise world blindness as a global problem requiring specific individual solutions and which are engaged in the prevention of blindness (POB or PBL).

### **International Organisations for POB**

These are government organisations, like the WHO and NGOs such as the IAPB, regional and national ophthalmological societies, institutions, hospitals, foundations and charities, interest groups such as Lions International and Rotary International, regional or national sub-speciality associations and ad hoc local volunteers. Other large NGOs involved in POB include Christoffel Blindmissien (CBM) and SSI who are also partners in the IAPB.

### *International Agency for the Prevention of Blindness (IAPB)*

Founded on the first day of January 1975 to foster universal cooperation against “avoidable” blindness (i.e., blindness that is curable or avoidable), the IAPB is a consortium of NGOs, national POB committees, and the

WHO, with a common aim: “to promote public awareness, utilise resources and support sight conservation programmes” through the implementation of the WHO’s health care strategies. IAPB acts as the co-ordinating umbrella organisation of NGOs working in WHO contiguous regions.<sup>8</sup>

#### *Helen Keller International (HKI)*

In 1925, the late blind and deaf Helen Keller challenged Lions International to be “knights of the blind.” Lions International now has SightFirst programmes worldwide committed to POB and these programmes are well documented on their website.

#### *Rotary International (RI)*

To celebrate Rotary International’s Centennial on 23 February 2005, several large-scale initiatives were launched to assist rotary clubs, mainly in India, Southeast Asia, Africa and Mexico, to help many poor people avoid blindness. Rotary International has in place an International Task Force for Health Concerns. In 2001, the then RI president Frank Davlin launched the International Eye Care Fellowship of Rotarians (IECFR) specifically to activate Rotarians and collaborate in POB programmes worldwide. Rotary’s work against avoidable blindness rests largely on its International Task Force for Health Concerns and on IECFR.<sup>5</sup>

RI has now organised itself towards contributing to prevent blindness worldwide, not only through many smaller efforts of clubs assisting each other, but also by making use of the Rotary Foundation’s powerful Matching Grant mechanisms, and by cooperating locally with experienced IAPB members, including Lions International, fully in the spirit of VISION 2020.<sup>5</sup>

#### **What is Vision 2020?**

Launched in Geneva on 18 February 1999, by WHO Director-General Dr Gro Harlem Brundtland, Vision 2020: The Right to Sight Global Declaration of Support is a global partnership aiming to eliminate avoidable blindness by the year 2020. The partnership involves the WHO, the Task Force of IAPB and international NGOs.<sup>9</sup>

Vision 2020’s mission is “to eliminate the main causes of blindness in order to give all people of the world, particularly the millions of needlessly blind, the right to sight.” It is an international initiative for joint global collaboration to recognise, and to take action now, so that the increasing problem of global blindness, estimated at 100 million worldwide, will not go blind by 2020.

#### *Objectives*

The actions and objectives of Vision 2020 are to:

- Support the right to vision 20/20 for all people in the world;
- Place vision on the national agenda in national eye health strategies;
- Create partnership programmes with NGOs and all POB organisations. It is important to have a slot on Vision 2020 in all avoidable blindness conferences, because our many mission objectives with regard to POB, are the same; and
- Garner political commitment from participating nations.

#### *Challenges*

1. Build public awareness;
2. Encourage professional “best practice”; and
3. Evaluate and refine strategies.

#### *How?*

Each of us have a part to play in POB, including these areas:

- World Sight Day/National Eye Care Day;
- NGO partnership – Rotary/Lions International collaboration;
- Be involved and participate in all interest groups, e.g. in senior citizens meetings, diabetes and glaucoma societies, associations of the visually handicapped, and enlist the help of optometrists and opticians;
- Inform community centres and villages of local POB activities;
- Community-based screening of elderly and refraction of school children;
- Align existing budget for eye care in national vision 2020 priorities; and
- Include eye care in funding projects/fund-raising.

#### **IAPB/Vision 2020 Achievements Summarised**

In May 1994, CBM and SSI in collaboration with IAPB/WHO established a Task Force for Prevention of Blindness. In September 1995, “Perfect vision 20/20 for the year 2020” was mooted by President of CBMI-USA A Harkey and Director of CBM Prof Foster as a public relations idea. It was adopted by the WHO in November 1995 and developed as a “Global initiative to eliminate avoidable blindness”. Following several drafts, Vision 2020 “The right to sight” was launched in February 1999 by the Director-General of the WHO in Geneva. Working sessions followed soon after the General Assembly of IAPB in September 1999.

In February 2000, in the context of their SightFirst Campaign, Lions Club International Foundation introduced a World Sight Day. They agreed to integrate World Sight Day into the Vision 2020 campaign.

In November 2000, the Task Force was integrated into the IAPB structure and in May 2003, the WHO Resolution on Elimination of Avoidable Blindness was adopted by the World Health Assembly. The adoption of this document expressed the strong commitment of WHO member countries to pursue the elimination of avoidable blindness worldwide. And in October 2003, on World Sight Day, Pope John Paul II officially recognised VISION 2020: The Right To Sight and blessed the fight against global blindness.

Today, the Task Force consists of 13 member organisations. Another 11 organisations are supporting members of VISION 2020. Official launches of VISION 2020 have taken place in all IAPB/WHO regions, and an increasing number of National Prevention of Blindness programmes are being developed and implemented.<sup>10</sup>

### Vision 2020/POB and Singapore

In Singapore, there is no national registration of persons with physical handicaps or blindness. A historical account may thus be traced of the practice and definition of blindness adopted in the country in order to study the pattern and problem of blindness locally. As far back as 1946, just after the Second World War, an attempt was made to maintain a count of blind persons by the Department of Health, now the Ministry of Health. These early files were handed over to the Singapore Association for the Blind (SAB) when it was founded on 6 November 1951 “to provide financial assistance and welfare for the blind”, but it was not until 1953 that a register of blind persons was started by the SAB, based on information provided by the government ophthalmologists at the then General Hospital.<sup>11</sup>

In 1953, Sir Clutha MacKenzie, himself blind, was sent by the Technical Assistance Administration of the United Nations, at the request of the Governments of Singapore and the Federation of Malaya, to advise on a programme for the blind, with particular reference to the development of blind services and facilities for rehabilitation. MacKenzie’s report<sup>12</sup> contained an account given by the late Mr AD Williamson, then eye surgeon at the General Hospital, on the chief sight-destroying conditions prevailing at that time. Speaking of the sight destroying conditions, Williamson observed that “keratomalacia, ophthalmia neonatorum, optic atrophy, cataract, congestive glaucoma, corneal ulceration, interstitial keratitis, iridocyclitis, penetrating wounds, intraocular tumours and trachoma were the chief causes”, but no actual figures were quoted. Although entries for blindness against cause were made from 1950, there was no definition of blindness as such that was adopted in Singapore at that time.

### Registration of Blindness in Singapore

Registration of blindness in Singapore is not required by

law and many of the “blind” who do not require social or other assistance from the Singapore Association of the Visually Handicapped (SAVH), the successor of SAB, refuse to be registered for fear of stigmatisation or other personal reasons. “Notification” of blindness, anonymously, is an option for the purpose of gathering data, but is not in practice locally.

Persons in Singapore were registered blind under 2 categories, (a) “totally blind” or (b) “partially blind”. A person was certified “totally blind” when he was unable to see anything, and “partially blind” when he could make out movements and shadows but had insufficient eyesight to carry out on an occupation where vision was necessary. Monocular blindness, by definition, was not registered. As certification was carried out by the ophthalmologists at the government General Hospital for the purpose of social aid and certification was not required by law, blind persons who were not referred to the Hospital by their doctors or private ophthalmologists were not registered.

In 1964, for the conformity of practice of the hospital staff, certification of “total” or “partial” blindness was discontinued, and a person was registered “blind” when he had:

- (a) Total absence of sight, or
- (b) Visual acuity not exceeding 6/60 or 20/200 (Snellen) in the better eye with correcting lenses, or
- (c) Visual acuity not exceeding 6/24 or 20/80 (Snellen) with a field of 10 degrees around fixation (20 degrees in diameter).

The current WHO definition was adopted from 1972. An entry on the primary cause of blindness was also included. Monocular blindness is not reported.

Lim<sup>13</sup> published the first local data for registration of blindness in Singapore for 1950 to 1964 and for 1965 to 1972. The changing causes of local blindness were analysed quadrennially. The prevalence rate of 55 per 100,000 population in 1964 and 67 per 100,000 population in 1972 was low compared to prevalence rates in other countries where blindness was then registered.

This study was followed by a publication by Low<sup>14</sup> for the period 1971-1980 and by Cheong and Khoo<sup>15</sup> for the period 1975-1983. Because of retrospective analysis, there were overlaps in the years under review. Cheong and Khoo also observed that there was a tendency to under-register blindness by a multiple of four. More recently, in 1996 to 1997, a well structured cross-sectional survey of the Chinese population at the Tanjong Pagar district in Singapore showed that of 1232 Chinese adults (aged 40 to 79 years), 45 (3.65%) had glaucoma (49% open-angle, 31% close-angle, 18% secondary and 2% unknown). Although a high incidence of poor vision due to glaucoma was found, it was

not a survey on the prevalence of blindness.<sup>16</sup>

The SAVH Annual Report for 2004/2005 showed 1111 persons registered blind and 1549 with low vision. For the June 2004 population of 4.24 million, the prevalence rate was 62.73 per 100,000 population. Even allowing for an estimated under-registration of blindness by a factor of 4, the prevalence rate is among the world's lowest.

### The Peculiar Problems of Blindness in Singapore (Table 1)

Singapore is a small island state (with a small geographical area and a “captive” population and “captured” health data). It has been said that only Singapore (apart from the Vatican) does not have a rural population and thus has been spared the horrors of blindness in the Third World. Hence, the magnitude of world blindness is not an epidemiological problem locally. Vision 2020 and POB is not a “health” or a “political issue” and has low priority with the government or local ministry of health. But the problems that confront us are unique.

Table 1. Visual Impairment in Singapore (SAVH cumulative data for 2004)<sup>17</sup>

Type of visual impairment	%
1. Diabetic retinopathy/maculopathy	20.1
2. Glaucoma	14.9
3. ARMD	13.4
4. Myopic degeneration	9.3
5. Retinitis pigmentosa	8.2

#### Diabetic Retinopathy

Singapore has the world's highest prevalence (11%) of adult-onset diabetes mellitus. Early detection of retinopathy include recommending all adult diabetics to have yearly eye checks as well as early detection of diabetes mellitus, adopting universally simple-to-use criteria for the determination of definable diabetes. Screening with digitalised fundus photos (subsidised at government polyclinics) are reported by ophthalmologists at a coordinating centre. Patients at risk are advised to consult their own physicians who have referral channels in place.

#### Glaucoma Targets

People with a family history of chronic open-angle glaucoma have a four-fold increased risk. Early detection and treatment is advocated. The problem is that nearly half of those with glaucoma are not detected or treated. Regular eye checks are recommended for those above 50 years of age, although glaucoma screening of population groups is not foolproof.

#### Age-related Macular Degeneration (ARMD)

ARMD is the “black hole” in ophthalmology – not only

do the afflicted suffer loss or distortion in their central visual fields but also the causes and treatment are still largely uncertain. It affects 2 people out of 3 elderly (especially in Western countries), of whom 1 in 4 will lose vision. There is no effective treatment. Smoking increases blindness rate three-fold. Exposure to strong sunlight (UVL) is also implicated. Linking up to low-vision services to use low-vision aids maybe of help. Much research and costly funded studies are still ongoing in major centres in the USA. Current research-oriented treatment modalities which offer some hope will not be discussed as it is outside the scope of this review.

#### Myopia

“School myopia” is now a national “epidemic” and getting worse. Large-scale epidemiological studies and research on myopia are ongoing within the Singapore context and a National Myopia Register was started in 2001 to monitor the situation. Fifty per cent of school children aged 8 years and 80 per cent of youths aged 18 to 21 years (pre-national service age) are myopic. Long-term study of the effects of rigid and hard contact lenses as well as the use of cycloplegic eyedrops appear to offer some benefit for school children.

#### Retinitis Pigmentosa

There is no effective treatment for this hereditary disorder. Genetic counselling for families at risk and low-vision mobility training can be offered.

### POB Activities in Singapore

There are many ongoing POB activities in Singapore, some long-term and institution-based and some ad hoc. Our prospects for the future and for “Vision 2020 Singapore” are reflected in the many POB programmes aimed not only at medical practitioners, but also at the population at large, in terms of an awareness of eye diseases that can cause blindness, safety precautions, adequate diagnosis, prompt treatment and research into the causes of blindness.

Some success had already been achieved, for example research into ocular trauma, backed up when necessary with suggestions for legislation. Eye injuries and blindness from firecrackers were totally eradicated when the sale of fireworks was banned in 1972.<sup>18</sup> Car seat-belts are now compulsory. Workmen at risk of missile injuries at the work-site are compelled to wear safety goggles. The development of trauma surgery and innovative primary procedures will save many an injured eye at risk of blindness. The advent of laser therapy and vitrectomy is helping the increasing numbers of diabetic blind. Medical practitioners are becoming aware of the dangers of undetected glaucoma. The dangers of using local steroidal eyedrops are always emphasised as well.

Active community service, such as the screening of senior citizens at the community centres and of school children for amblyopia and refractive errors in school clinics, have been developed into standard eye health care programmes.

In 2001, the National Committee on Ophthalmology was a signatory to Vision 2020 to bring this declaration to the notice of government. The Ministry of Health has published Clinical Practice Guidelines on cataracts (July 1999), diabetic retinopathy (October 1999 updated Nov 2004), contact lens care (January 2001), laser refractive surgery (July 2004), glaucoma (in press), and endophthalmitis (under preparation) to all registered doctors.<sup>19</sup> These guidelines are based on the best available clinical and scientific evidence in the management of local blinding conditions. In 2004, Rotary International District 3310 in our region also signed this declaration of support. Four avoidable blindness conferences and workshops were organised in Malaysia and Singapore over the last 2 years with speakers emphasising that although POB may appear to be well contained locally, the population as a whole continues to age, with a predictable increase in the workload. Degenerative conditions like ARMD and lifestyle conditions like diabetes and possibly myopia continue to require active screening and primary health measures to ensure those most at risk are not forgotten or missed. The SAVH is very active and aware of the significance of these problems, working closely with the government's Public Health Department.<sup>10</sup> Rotary International District 3310 in our region will in 2006 launch the "Avoidable Blindness Foundation" to coordinate POB activities in Singapore and Malaysia.

The ranking causes of acquired blindness in Singapore, diabetic retinopathy and maculopathy, glaucoma, ARMD, myopic degeneration and retinitis pigmentosa, are not likely to change much in terms of percentages, but the frightening fact is that the numbers of people losing vision within each category will increase.

Childhood blindness and adult-onset blindness are now our problems at the two extremes of life, for which research and development and no likely answers are forthcoming.

## Conclusion

There never was nor will ever be an easy solution to POB, but unless we start with ourselves and at our own doorstep, world blindness, after all is said and done, will remain a major world disaster. In the final count, Vision 2020 may never be an achievable target, noble as our aims may be. By year 2020, when we have eliminated the "causes" of blindness as we now know them, there will emerge "new" causes as yet unknown. But the challenge must go on,

otherwise major epidemics as we had in the past, like smallpox and poliomyelitis, will still be with us.

## Summary of Some POB Activities in Singapore

1. Prevalence trends:
  - a. Annual (started in 1950) registration of blindness (SAVH).  
The prevalence rate of 63 per 10,000 population (under-estimated) is the lowest reported.
  - b. Low-vision clinic and low-vision aids for the visually handicapped (SAVH)
2. Eye screening:
  - a. Community-based screening of the elderly
    - Yearly eye screening (started in the early 1970s) at various community centres throughout the country, on rotation (Singapore Women's Association)
    - Eye screening in old folks' home (Lions) and Rotary Service Centres
3. Myopia:
  - a. National Myopia Register, started in 2001  
Compulsory refraction for school children
  - b. Long-term study of effects of rigid/hard contact lenses and eyedrops
4. Legislation:
  - a. Eye Banking (Human Organ Transplant Act)
  - b. Legislation (1972) to ban fire crackers, which caused severe eye injuries  
Compulsory car seatbelts  
Industrial safety enforcement
5. Diabetes mellitus:
  - a. National Diabetic Retinopathy Screening and Educational Programmes (1991)  
[Family Health Services, Primary Health Division, Ministry of Health (MOH)]
  - b. Ongoing subsidised fundus photo for diabetics, extended to government polyclinics and community centres
6. Professional "best" practice:
7. Clinical Practice Guidelines for local blinding diseases
8. Public awareness:
  - a. World Sight Day/National Eye Care Day (Singapore National Eye Centre) to create public awareness
  - b. Conferences on Avoidable Blindness by various interest groups
9. Public forums on eye safety
10. Research:
  - a. Epidemiological surveys:

- Chronic glaucoma in adult Chinese community in Tanjong Pagar
  - Singapore Malay Eye Survey
- b. Ongoing research on childhood and adult blindness
11. National Committee of Ophthalmology:
- Appointed by Minister to oversee all aspects of ophthalmology for the country
- National Programme for the Management of the Major Eye Diseases in Singapore (18-page report submitted to the MOH on 31 July 2000)
  - National Key Disease Management Plan – Prevention and Control of Myopia (141-page report submitted to the MOH on 13 September 2000)
  - A 5-year Research Programme for Ophthalmology prepared by A/Prof Donald Tan (37-page report submitted to the MOH on 13 September 2000)
  - Initiating the National Programme for Pre-School Eye Screening with the Steering Committee for the National Myopia Prevention Programme (NMPP)
  - Establishing the Singapore Myopia Registry, with the Singapore Myopia Registry Committee, 2001
  - Reviewing Manpower Projection for Ophthalmology, with the Specialist Training Committee for Ophthalmology, 2003

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