

Prevention of Blindness

I K Jalili

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8.1 Introduction

Prevention Tools

Addressing blindness involves multiple approaches encompassing on the one hand prevention and intervention measures, and on the other hand concerted efforts at governmental and non-governmental levels with individual participation and collaboration. Prevention, with mass education being the core element, should be targeted in line with local needs. The issues range from measures such as mass vaccination (e.g. rubella, small pox etc.), to screening programmes. The latter would include locally tailored projects such as screening children for trachoma and onchocerciasis in endemic areas, VAD, ROP, diabetic retinopathy and age related conditions including cataract and glaucoma. ⁽¹⁾ When indicated, a referral to specialised centres should follow. ^{(2) (3) (4) (5)}

Education is a major component of prevention in both developed and developing countries for conditions such as glaucoma and diabetic retinopathy, and in developing and least developed countries, for trachoma, onchocerciasis, TEMs, abuse of ‘over-the-counter medications’ such as topical steroids, *con#anguinity* etc. ^{(6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30)}

The other facet of combating blindness is mass intervention to treat endemic conditions such as trachoma with azithromycin/tetracycline; onchocerciasis with ivermectin, VAD with various measures such as vitamin A supplements. ^{(2), (6), (7), (18), (31), (32), (33), (34), (35)}

Prevention should go side by side with sustained efforts to upgrade health facilities such as the transfer of technology, training of health care personnel, setting up specialised and supporting services such as eye banks, genetic counselling services and genetic laboratories, and must not overlook the need to ensure continuous medical education. A more optimistic target would be the avoidance of wars with all that they bring with them; drainage of resources, poverty, malnutrition and disease, not to forget the human resources as a result of the exodus of technocrats and experts that is commonly associated with wars and a further hindrance to already meagre and scarce socioeconomic progress. ^{(27), (28), (36), (37), (38)} Concomitant economic development is also necessary to reduce, and eventually eradicate, much of the preventable and avoidable causes of blindness. ⁽³⁹⁾

8.2 Prevention Programmes

History of Prevention Programmes

Prevention programmes have been established in most parts of the world to tackle local blinding conditions. The dominant player has been the WHO, which, since its inception, has endeavoured to support Member States in their task of tackling blindness.

In 1975, the WHO helped in the creation of the International Agency for the Prevention of Blindness (IAPB). This led to several other initiatives. The founder members of IAPB included the International Council of Ophthalmology (representing the International Federation of Ophthalmological Societies), the World Council for the Welfare of the Blind (renamed the World Blind Union), and two international NGOs; the American Foundation for the Blind (later renamed Helen Keller International) and the Royal Commonwealth Society for the Blind (later renamed Sight Savers International).⁽⁴⁰⁾ These efforts culminated three years later in the establishment of the WHO Programme for the Prevention of Blindness (WHO/PBL) in 1978.

The strategy adopted by the PBL was based on the declaration of the International Conference on preventive health care (PHC) held in Almaty, Kazakhstan, in the same year. The strategy was the delivery of eye care as an integral part of primary health care; the concept of ‘primary eye care’ was developed and has been followed since. The WHO also addressed data collection on blindness and established standardised guidelines and protocols for this purpose.^{(41), (42), (43), (44)} The initial priorities focused on were onchocerciasis, xerophthalmia, cataract and trachoma.

One of the early initiatives of WHO/PBL was to establish methodical programmes for the prevention of blindness in a number of Member States. This promoted and widened the remit of existing and partially defunct national trachoma

control programmes to encompass xerophthalmia and cataract.

By the mid-1980s, over 50 national programmes, committees, or focal points had been established and by 1998 this number had increased to over 110. The WHO was pivotal in these developments, through providing guidelines, sending consultants, and working with international non-governmental organisations.⁽⁴⁵⁾

Programmes

Prevention of Onchocerciasis (OCP)

The Onchocerciasis Control Programme (OCP) in 1974 was a major step for the WHO and their efforts to combat this disease in 7 countries in West Africa. This programme was jointly sponsored by a large consortium of agencies, organisations and donor countries and was scheduled to end by 2002. Additional steps to address onchocerciasis saw the development in 1992 the Onchocerciasis Elimination Programme for the Americas (OEPA), and the African Programme for Onchocerciasis Control (APOC) in 1995.^{(46), (47), (48), (49), (50), (51), (52), (53), (54), (55), (56), (57), (58), (59), (60), (61), (62), (63), (64), (65), (66), (67), (68), (69), (70),}

Prevention of Diabetic Blindness

In 1989, an initiative to improve diabetic care and reduce diabetic complications in Europe was pioneered by the WHO together with the International Diabetic Federation (IDF). A meeting of representatives of Government Health Departments and patients’ organisations from all European countries, together with diabetes experts, was held in St. Vincent, Italy on October 10-12, 1989. It culminated in the St Vincent Declaration which recommended combined efforts to improve the life of diabetic patients, both quantitatively and qualitatively, to that of the general population and to promote the prevention and cure of diabetes and of its complications by intensifying research efforts.⁽⁷¹⁾

VISION 2020

Emergence of Vision 2020

All the previous cooperative activities mentioned in 11.2 guided by the information compiled in the WHO Global Database on Blindness, and the expertise gained over the years, culminated in the emergence of the initiative of Vision 2020. This is, The Global Initiative for the Elimination of Avoidable Blindness, referred to as “VISION 2020 - The Right to Sight”, launched in 1999, as a collaborative effort between WHO and a number of international NGOs and other interested partners. This aimed at achieving the goal of eliminating avoidable blindness worldwide by the year 2020. The organizations involved are called the ‘Task Force’.^{(27), (36), (37), (38), (72), (73), (74)}

Objectives

The objectives of VISION 2020 programme is in the prevention, treatment and rehabilitation of avoidable blindness. Emphasis is given to the issues of advocacy, regional planning and resource mobilization building on the international and national experience gained through the existing national programmes. The approach is based on 3 strategies namely: (1) developing and improving primary eye care programmes within the primary health centres (PHC) set up to eliminate preventable conditions; (2) developing therapeutic and surgical support services to deal effectively with "curable" eye problems; and (3) establishing optical and low vision services.⁽³⁶⁾

This would achieve: disease control, infrastructure development, and human resource development.

Implementation

The implementation involves three tiers; advocacy through WHO/IAPB, planning by national PBL programmes, implementation through Vision 2020 centres and community eye care.

Vision 2020 will be implemented through four 5-year periods, the first started in 2000. The three subsequent phases of implementation will commence in 2005, 2010 and 2015 respectively. Countries are chosen on the basis of the size of

the burden of blindness and of available resources.^{(36), (75)}

Other Logistic Aspects

In terms of other logistic aspects of achieving the objectives, these are:

Human Resources Development

The programme encourages the development of human resources at various levels of the health care system, with emphasis on mid-level personnel and expanding on the already ongoing programmes in many of the sub-Saharan African countries such as Bamako (Mali) and Lilongwe (Malawi) in cataract surgical training.^{(27), (76)} In addition, it is also aimed to deploy ophthalmologists at higher tiers of the health care system to provide specialist care.⁽²⁷⁾ For mid-level personnel, the target is to achieve a ratio of 1:100,000 to 1:50,000 populations, by the year 2020, as compared to 1:400,000 in Africa and 1:200,000 in Asia today. With regard to ophthalmologists, a ratio of 1:250 000 in Africa is expected from the present 1:500 000 level by the year 2020. The corresponding target for Asia would be 1:50,000 by 2020 from the present level of 1:200,000.⁽²⁷⁾ Other categories of personnel to be trained include refractionists, managers for national / regional prevention of blindness programmes, as well as paediatric ophthalmologists and instrument maintenance technicians.

Building National Capacities

Apart from human resource development, Vision 2020 envisages building sustainable national capacities that could work towards universal coverage and easy access to eye care services.⁽⁷⁷⁾ Global targets include the achievement of not less than 95% availability, 90% accessibility, 90% utilisation and 90% coverage of services by 2020, as compared to 50%, 40%, 25% and 25% respectively in 2000.

Transfer of Technologies

Another task for the programme is to promote and support the transfer of technology to developing countries by allowing manufacturing,

by non-profit making bodies, of high-quality equipment and consumables at low cost e.g. intraocular lenses, eye medications, sutures, spectacles and low vision devices, together with the formation of regional consortiums for the purchasing in bulk of equipment and spare parts, instruments and consumables to reduce costs, including maintenance and repair expenses.⁽³⁸⁾

Medical Conditions Selection in VISION

The Basis of Selection

Conditions were chosen on the basis of the burden of blindness they cause and the feasibility and affordability of interventions to prevent and treat them. These are cataract, trachoma, onchocerciasis, CB and refractive errors and low vision. Other blinding conditions such as glaucoma and diabetic retinopathy are to be addressed at a later stage. For cataract, the goal is to increase surgical productivity in addition to achieving; high success rates, affordable and accessible services, and measures to overcome barriers and increase the use of services.⁽³⁷⁾ Refractive errors and low vision are addressed by making refractive services and corrective spectacles affordable and available to the majority of the population through primary health care facilities, vision screening in schools and low-cost production of spectacles. Similar strategies will be adopted to provide low vision services.

Age-Related Blindness

Attention has been paid recently to addressing the prevalence of age-related cataract in the developing countries, top of the list of conditions focused upon by Vision 2020. Surgical throughput in poor countries is very low as a result of a combination of factors, including financial constraints and cultural barriers in accessing services together with low productivity. The programme aims to increase the number of cataract surgeries performed which is currently estimated to average 200 Cataract Surgical Rate per million (CSR) in the whole of Africa, compared to that

of the Australia with 6,300; USA 5,500; and the UK 3,800. The CSR in developing countries varies from 100 in Nigeria, 450 in Kenya to 3,100 in India. Table 8.1 gives estimated CSR for different WHO regions.

The strategies applied will include concerted teamwork, training, and better management, monitoring and evaluation of services. In global terms, the WHO believes in the need to increase the estimated 7 million cataract operations at the planning of the programme to 12 million in the year 2000, and to 20 million in 2010, reaching a final target of 32 million by the year 2020.^{(27), (36), (37), (75), (78), (79)}

Table 8.1 Estimated CSR for different WHO regions worldwide in 1999

WHO Region	Pop. in M	M / year	CSR*
Africa	650	0.2	300
E. Mediterranean	500	0.5	1000
Western Pacific	1650	1.65	1000
Europe	900	2.1	2300
Western Europe	400	1.6	4000
Eastern & Central	500	0.5	1000
South East Asia	1500	3.6	2400
Americas	800	2.15	2700
North	300	1.65	5500
Central & South	500	0.5	1000

* Cataract Surgical Rate per million (M) populations (Pop). Adopted from Foster's update of Johnson's table.⁽¹¹⁵⁾

Prevention of Trachoma

In 1985, the International Trachoma Initiative (ITI) was founded by the co-operation of Pfizer and Edna McConnell Clark Foundation, the WHO, the ministries of health in certain countries, and NGOs such as Helen Keller Worldwide. The various bodies involved in the prevention of trachoma are grouped under the 'WHO Alliance for the Global elimination of trachoma.'⁽⁸⁰⁾

The initiative (ITI) aimed at: 1) identifying trachoma endemic countries; 2) mapping the disease; 3) initiating community-based hygiene programmes; and 4) ensuring surgery is widely

available. Approaches were self-tailored to suit the various socio-cultural settings.⁽⁴⁾ The initiative (ITI) was modelled on the implementation of 'SAFE' strategy relying on mass treatment using azithromycin. The projections were to treat at least 60 million people with active disease and perform some 5 million trichiasis surgeries between 2000-2010.^{(4), (32), (36), (37), (77), (81), (82), (83)}

Considerable success has been achieved. In four years, more than 7 million individuals have received treatment, resulting in a cumulative reduction of 50% in active disease rates in children. More than 60,000 have also benefited from lid surgery. Morocco and Tanzania are two of the countries that benefited from the programme. The former is expected to attain the elimination of blinding trachoma by 2005. The programme continues to focus on residual foci of severe disease and to evaluate techniques used in trichiasis surgery. Some recently evaluated techniques offer particularly good results.^{(2), (84)} The rate at which ocular chlamydial infection returns to a community after mass treatment suggests that the elimination of infection in a hyperendemic area is feasible with biannual mass antibiotic administrations and attainable coverage levels.⁽¹⁷⁾

Currently, trachoma control will be executed through WHO Global Elimination of Trachoma 2020 programme (GET 2020), which is a component of Vision 2020.^{(36), (37)} Bailey and Lietman raised the likelihood of some hurdles that might be faced by the programme. These include: aspects of trichiasis surgery and the frequent recurrence of entropion, the existence of other ocular abnormalities that could trigger blindness such as the tear film and lid closure, the possible emergence of a serious resistance to antibiotics and the risk of their side effects, the limited duration of the efficacy of antibiotics, cultural barriers and the bureaucratic obstacles in some countries that might arise from poor communication between the administrative authorities.⁽⁸⁵⁾

Onchocerciasis

Onchocerciasis is the third condition addressed by Vision 2020. Over the last 25 years consid-

erable progress has been made by the Onchocerciasis Control Programme in West Africa (OCP) through vector control and Ivermectin distribution, the distribution strategy being designed to control the skin and eye disorders that result from heavy infections.^{(29), (86), (87)} This success, when expressed in health, economic and development terms, was the motivating rationale for the launching in December 1995 of a new programme, African Programme for Onchocerciasis Control (APOC).^{(37), (88)} This latter programme is a vector control to completely interrupt the transmission cycle of the parasite by applying larvicide to riverine breeding sites. In the Americas, another strategy being implemented is to use ivermectin more than once a year, not only to stop progression of disease, but also to interrupt transmission. The long-term sight-saving effect of ivermectin in cases of established ocular lesions has not been ascertained.⁽²⁾ Elimination of onchocerciasis from most endemic foci in Africa appears to be possible. However, the requirements in terms of duration, coverage, and frequency of treatment may be prohibitive in highly endemic areas.^{(89), (90)} It has been suggested that for most affected parts of Africa, in the absence of vector control, ivermectin treatment should primarily be considered as a measure for controlling morbidity by reducing transmission and microfilarial loads, for which purpose annual treatments would probably suffice.⁽⁹⁰⁾

In Latin America, the Onchocerciasis Elimination Programme in the Americas (OEPA) is successfully using ivermectin distribution. A coordination group of NGOs is working closely with all three onchocerciasis control programmes and with national counterparts in virtually all endemic countries.⁽³⁷⁾

Onchocerciasis is expected to be brought under control by the year 2010 if present efforts in endemic countries are successfully completed.⁽³⁷⁾

Eradicating VAD

Eradicating blindness from VAD by the year 2000 was the goal set by the World Summit for Children in 1990, and this has been successfully

achieved in some countries. However, there are still 78 countries where VAD remains a public health problem.⁽³⁷⁾ This task has been adopted by the WHO in partnership with several NGOs. The approach involves both short-term interventions side-by-side with long-term sustainable solutions. The short-term measures are carried out through encouraging proper feeding at infancy via the encouragement of breastfeeding, together with vitamin A supplementation by the periodic supply of high-dose vitamin A. This policy has succeeded in reducing mortality by 23% overall, and by up to 50% for acute measles sufferers. However, as breastfeeding is time-limited and the effects of vitamin A capsules last only 4-6 months, additional long-term solutions have been implemented including food fortification (e.g. sugar in Guatemala) and promoting home gardens for vulnerable rural families as a complimentary measure. These have been tried in Africa and South-East Asia by promoting the growing of fruits and vegetables. Considerable success has been achieved, and in 1998 alone vitamin A supplements were delivered through national immunization days to children in 40 countries.⁽⁹¹⁾

It is also important to address malnutrition in general. The challenge is to deliver effectively interventions dealing with malnutrition in the areas of need,^{(92), (93)} It has been suggested that the formation of an African food and nutrition group, working with all African food and nutrition workers, can lead the way in addressing this problem and make use of under-utilised African resources in solving the problem.⁽⁹⁴⁾

Emerging Diseases Trends

The needs of countries in terms of specific emerging diseases such as diabetic retinopathy, glaucoma and age-related macular degeneration will be included in VISION 2020 activities, as some of the more easily preventable and curable priority conditions come under control. However, in countries where many of the other diseases currently included as global priorities for VISION 2020 do not exist, attention should be given to specific emerging ocular diseases,

some of which are already assuming public health dimensions.⁽⁹⁵⁾

Prevention Objectives in The Middle East

Objectives to address blindness in the MEC have been:

1. Cataract; both age related and paediatric.
2. Trachoma and corneal ulcerations; identification and treatment including surgical treatment of trichiasis and entropion.
3. Screening and treatment of glaucoma.
4. Addressing the common practice of consanguinity with a systematic approach to include participation of religious bodies in any educational campaign.
5. Improving surgical training to combat high surgical complication rate.
6. Legislation restricting 'over-the-counter' medicine especially topical steroids and antibiotics combined with educational campaign.
7. Educational campaigns on blinding conditions such as glaucoma and diabetic retinopathy, folk medicine and other issues.

8.3 PREVENTION OF CHILDHOOD BLINDNESS

Childhood Blindness in Vision 2020

The programme focuses on the preventable and treatable causes of CB.^{(35), (96)} The former includes: corneal scarring from VAD/measles, and in the treatable conditions cataract, retinopathy of prematurity, low vision and significant refractive errors are included.

Gilbert summed up the tasks required to be addressed in tackling CB as: female education, empowerment of women, addressing cultural practices, good primary health care and primary eye care, good optical services, good surgery and follow up, and special education and rehabilitation.⁽⁹⁶⁾

Vision 2020 Targets in Childhood Blindness

The approved targets for disease control are: ⁽⁹⁷⁾

1. Reduction of the global prevalence of CB from 0.75/1000 children to 0.4/1000 children.
 2. Eradication of corneal scarring from VAD, measles, and ophthalmia neonatorum.
 3. Elimination of new cases of CRS.
 4. Surgical management of paediatric cataract in specialised centres together with immediate and effective optical correction.
 5. Screening of all babies at risk of retinopathy of prematurity and treatment to be provided when indicated.
 6. Vision screening to all school children, as part of school health programmes, with provision of glasses for those with significant refractive error.
1. Screening of neonates for ocular abnormalities and cataract at birth and ensuring early case detection and prompt referral to the specialised centres.
 2. Introducing screening programmes for pre-school children.
 3. Vaccination for measles and rubella.
 4. Management of congenital cataract in specialised centres.
 5. Early diagnosis and treatment of congenital glaucoma with proper follow up of these children to ensure continuity of care.
 6. Trachoma screening with mass treatment.
 7. Early and prompt management of bacterial corneal ulcers.
 8. Genetic counselling, including pre-marital risk counselling.
 9. Serious multidisciplinary programme to address consanguinity with the involvement of the media, non-governmental organizations and religious bodies and ensuring that there is an enlightened preaching on this issue in mosques, universities, and media.
 10. Emphasis on the need to establish specialised paediatric ophthalmic services in dedicated centres with expertise in the assessment, surgical treatment, and long-term management of the child with cataract. ⁽¹¹⁰⁾
 11. Orthoptic services at hospital and community levels to ensure continuity of care for these children.

Genetic Counselling

Methods of prevention of hereditary disease by screening and early treatment of people were outlined by Jay and Johnson and Green. ^{(98), (99)}

This would involve a primary and a secondary prevention. The former involves genetic counselling and the latter is with or without carrier detection, prenatal diagnosis and treatment or selective abortion of the affected foetuses. It was estimated that maximal application at that time might reduce the rate of genetic blindness in the west by one third from 0.3% to 0.1% of the population.

Prevention of Childhood Blindness in the Middle East

Required Measures

In the Arab world and the rest of Middle East Crescent group of countries with its wide gulf in the availability of resources and health services, the main objectives of any prevention programme would need to address the following issues: ^{(13), (28), (100), (101), (102), (103), (104), (105), (106), (107), (108), (109), (110)}

WHO Countries Priorities

For the WHO, prevention of CB is a priority. Five countries in the Region, namely Egypt, Islamic Republic of Iran, Morocco, Sudan and Pakistan, will receive support from the Lions Clubs International Foundation over the next five years to address CB in their countries with an emphasis on correcting refractive error. ⁽¹¹¹⁾

Steps Taken by Arab Countries

A number of Arab states are taking serious steps towards the elimination of preventable blindness including Saudi Arabia, Oman, Morocco and have achieved considerable results in the control of blinding trachoma. As stated earlier, trachoma is also a priority of the WHO campaign for the

Global Elimination of Trachoma (GET2020) in these countries. ^{(13), (14), (28), (85), (100), (101)} Vision 2020 has been launched in 10 Member States in the Region, namely; Bahrain, Egypt, Lebanon, Saudi Arabia, Tunisia, Sudan, UAE, Qatar and Yemen. ⁽¹⁴⁾

The educational programme set up in Oman to target the rural population and shed light on the causal relations between chlamydial conjunctivitis and the later complications, trichiasis, corneal ulcer and eventually blindness, was not successful and did not match the socio-cultural aspects of the population. ⁽¹¹²⁾ The booklet prepared for this purpose was very poorly understood as a result of the high illiteracy of the population, and unsuitability of the illustrations used. Currently, the Oman Government has set up the mid-decade and end-decade goals and the 6th Five-Year Plan of the Ministry of Health has laid down the objectives and activities of the Prevention of Blindness Control Programme in collaboration with the WHO.

According to the WHO, the prevalence of trachoma in Oman is low (< 1%) and the SAFE programme is well underway. Early detection and management of diabetic retinopathy have been strengthened at the regional hospitals. In addition, measures to control diabetes have been undertaken such as the integration of diabetes control programme to PHC, a national diabetes registry and annual training workshops, and a policy for ocular examination for all new diabetics was adopted. ⁽¹¹³⁾

In the prevention of blindness, a lack of information on the public health importance of glaucoma, low awareness of glaucoma and difficulties in the early diagnosis and prompt treatment of glaucoma have been major constraints, followed by the high cost of importation of donor cornea, the presence of trachomatous dry eyes, prevalence of maculopathies, irregular control of diabetes and insufficient resources at regional levels. ⁽¹¹³⁾

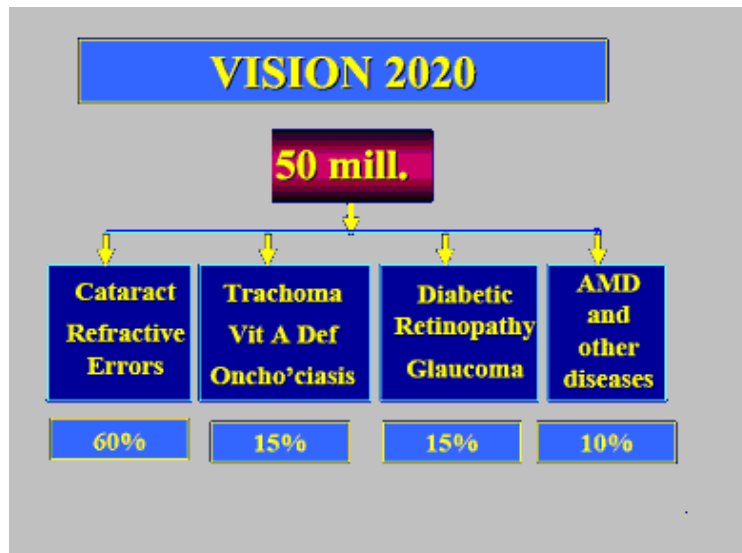
In Yemen, a collaborative national programme between NGOs and the Ministry of Health IMPACT/EMR, was launched for the prevention of blindness from cataract in 1995 and carried

out in several locations in 3 cities. In addition to the elimination of the backlog of cataract, the programme also aimed at increasing the number of ophthalmologists by training local Yemeni doctors. For this purpose, a 12-month diploma course in ophthalmology has been initiated in collaboration with the WHO. Fifteen doctors were enrolled in the 1996-1997 courses and priority in selection was given to those from rural areas. It was ensured that the ophthalmologists trained through the programme serve a minimum of two years in remote villages where access to care is limited. ⁽¹¹⁴⁾

8.4 Conclusions

In conclusion, there have been ongoing campaigns to combat blindness in poorer countries with special emphasis on Africa. (Figure 9.1) These initiatives were pioneered by the WHO, in close partnership with other organisations such as the World Bank, national governments and a large consortium of international NGOs. Examples of these programmes are the OCP, OEPA and APOC which were implemented in 36 endemic countries. In 2001 alone, some 200 million treatments with ivermectin were carried out.

The newer initiative, Vision 2020 on the other hand, shall also address, in addition to disease control, infrastructure and human resource development in these countries. There will be specialist training programmes in East, West and French speaking Africa and paramedic national training programmes in the larger countries. All these efforts shall be targeted to the 65% treatable and preventable causes which are cataract, refractive errors, trachoma and its sequelae, VAD and onchocerciasis.

Figure 8.1 Vision 2020 initiative and conditions targeted ⁽⁷⁵⁾

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