

## 7 EPIDEMIOLOGY OF BLINDNESS WORLDWIDE

### 7.1 Global Blindness Today

An exact figure on the number of blind is not available, but it is estimated that blindness affects some 45 to 50 million people worldwide. Every 5 seconds, one person in the world goes blind. Of every 10 blind people, 7 live in Asia and 2 in Africa<sup>181, 597</sup>, with an increase of 1-2 million each year. An additional 135 million are estimated to have low vision and it is expected that the number of blind will roughly double by 2020<sup>65, 411</sup>. The prevalence and causes of blindness remain vastly different in the various

## Global Blindness

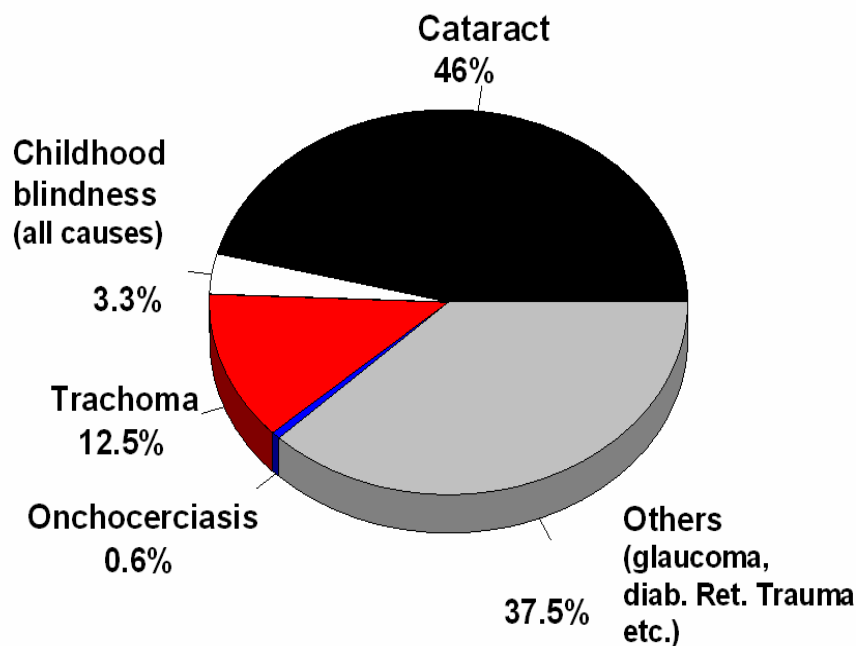


Figure 7-1: Global Blindness

Adopted from Blindness: Vision 2020 - The Global Initiative for the Elimination of Avoidable Blindness. WHO Fact sheet No.213, revised February 2000<sup>483</sup>.

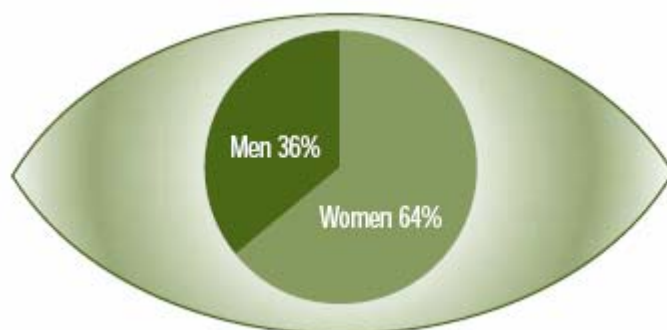
<http://www.who.int/mediacentre/factsheets/fs213/en/>

parts of the world and are greatly influenced by socioeconomic, geographical and political factors (Table 7.1). These factors contribute to the considerable gulf in the size of the problem and also to the wide variations in the pattern of blindness between the developed and developing countries<sup>79, 115, 154, 247, 487, 597, 589, 602, 634</sup>.

## 7.2 Factors Influencing Blindness Epidemiology

Globally, blindness is associated with old age and being female (Figure 7-2). The former is the result of the increase in the size of the population and their age, which has almost doubled in the past 25 years (Figure 7-3) despite the improvement in services<sup>597</sup>. The majority of the blind are in the age group 70 and over.

In addition, in some developing countries, gender differences remain a challenge and it has been noted that little change in the excess of blindness in women has taken place in the past 20 years, as evidenced in rural Malawi<sup>275, 400, 573</sup> (Section 6.1).



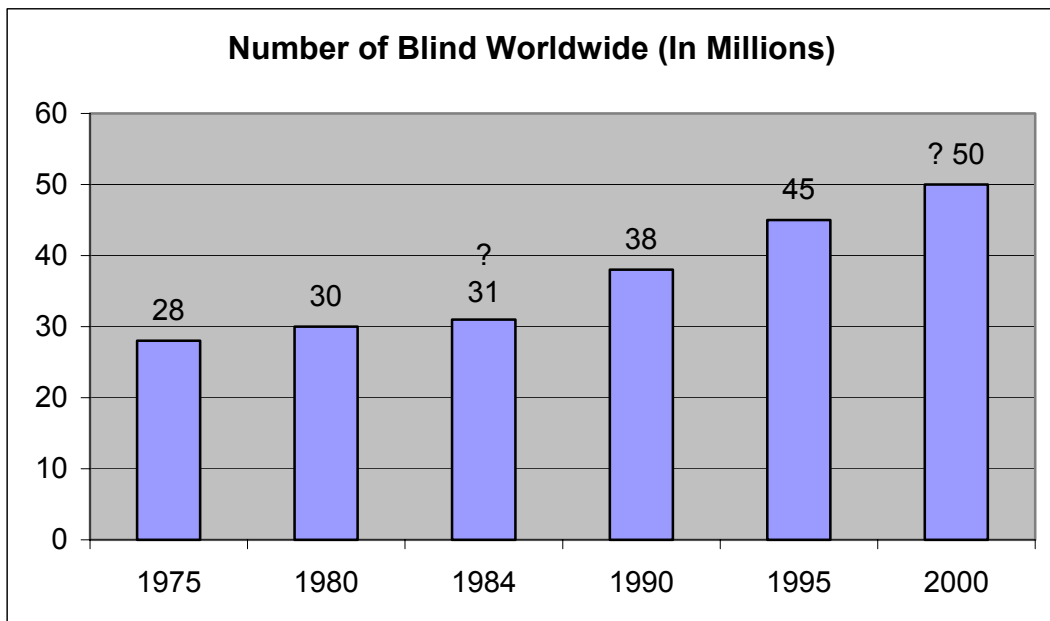
**Figure 7-2: Gender and blindness worldwide**

Adopted from Abou-Gareeb, Lewallen, Bassett & Courtright. *Gender and blindness: a meta-analysis of population based prevalence surveys*. *Ophthalmic Epidemiology* 2001; 8:39-56<sup>275</sup>

Other factors are related to socio-demographic and socioeconomic status, such as educational attainment, and occupation. These factors reflect the combination of exposure to specific risk factors for blinding eye diseases on the one hand, and the utilisation of preventive and curative services by specific sectors of the population on the other hand<sup>355</sup>.

### 7.3 Trends in the Patterns of Blindness

The pattern of blindness is a dynamic equation, with some diseases diminishing and disappearing, and others appearing or taking more prominence. Disease such as trachoma, onchocerciasis and VAD are decreasing and becoming less of a problem with intervention, improvement of facilities and improvement in socioeconomic conditions. Others such as cataract, refractive errors, glaucoma, and diabetic retinopathy are increasing. (Table 7-2). Whilst causations from small pox have disappeared, we see other new conditions appearing such as the emergence of AIDS and injuries from landmines<sup>75, 76, 86-88, 120, 122, 253, 295, 320, 334-338, 341, 350, 364, 397, 400-401, 405, 487, 539, 541, 544, 567, 589</sup>.



**Figure 7-3: Number of blind worldwide**  
(Modified from Foster A, Global Blindness)<sup>597</sup>

### 7.4 Blindness in Developing Countries

Blindness is a major problem in most developing countries. It occurs at ten times the rate of that seen in the developed countries and in over 80% of cases is either preventable or curable. The four main causes are cataract, trachoma, onchocerciasis and xerophthalmia<sup>227-228, 286</sup>. Data on other

blinding conditions, such as diabetic retinopathy in the developing countries, are scarce <sup>411</sup>.

The prevalence of blindness follows an interesting mathematical pattern in the different continents based on the degree of development and socio-economic conditions <sup>597</sup> (Table 7-1).

<u>Economy//Health Care</u>	<u>% Blind</u>	<u>Blind / Million</u>
Good (EME)	0.25	2500
O.K. (Latin America)	0.50	5000
Poor (Asia)	0.75	7500
Very Poor (Africa)	1.00+	10,000+

**Table 7-1: Prevalence of blindness based on the economy and health-care status. Adopted from Foster A, Global Blindness <sup>597</sup>**

The problem in the developing countries is compounded by the poor uptake of eye services in Africa; an additional obstacle in eliminating blindness, which adds to the magnitude of the problem in the developing countries. Melese et al highlighted this in his study in Ethiopia, where he found only 27.8% of the cohort studied used the services available. This was associated with being male, having binocular visual loss, and blindness. The main obstacle for the reluctance in using the service was financial constraints arising from the indirect costs, such as travel, accommodation, etc. <sup>415</sup>

## **7.5 Blindness in the Developed Countries**

Infectious diseases such as trachoma have disappeared from most of Europe and North America, concurrent with improvements in hygiene that accompanied the increase in prosperity <sup>227-228, 390</sup>. There is, however, still a demarcation that exists between the Western European countries in the EME band and in the PSE band <sup>76</sup>. In the EME the commonest cause of blindness in adults are age related disorders which exist with some regional differences. This in particular applies to ARMD which is the leading cause of registered legal blindness among those aged over 65 in the USA, Western Europe, Australia, and Japan <sup>625-627</sup>. In Denmark 95% of the registered sub-

jects with ARMD were above 70 years of age. The median age was 82 for both genders. An exponential rise of registered blindness from the condition was detected from age 60 to 90 with a decline in incidence after the age of 90 that was explained on the basis of under registration of very old persons.

<b>Causes, Percentages and Trends of Global Blindness</b>		
<b>Cause</b>	<b>%</b>	<b>Trend</b>
Cataract	50	Increasing
Refractive errors	10	
Glaucoma	10	
Diabetic retinopathy	5	
ARMD/and Other Diseases	10	
Trachoma/ Infective Scars	12	Decreasing
Onchocerciasis	2	
Vitamin A Deficiency	1	

**Table 7-2: Causes, proportion and trends of blindness worldwide**

Adopted from Foster A: Global Blindness<sup>597</sup>

## **7.6 Prevalence in Developed Countries**

The prevalence of blindness in Europe ranges between 0.1-0.41/1000<sup>76</sup>. In Scotland, the prevalence in 2003 was 4.6/1000<sup>183</sup> and in France 0.17/1000<sup>191</sup>. Figures are extracted from blind registers, with their recognised pitfalls, especially as these tend to under estimate the size of the problem, particularly among the severely visually impaired (partially sighted)<sup>76,184,185,187</sup>.

## **7.7 Blind Registration**

This tendency of non-registration was particularly noted among elderly men and with a female predominance of 2.8:1. In Britain, the regist-

ration for ARMD has increased by 30-40% and it has been thought that the incidence of this is increasing <sup>186, 626, 627</sup>. The prevalence of blindness from this condition was estimated to increase 100-fold from the age group 60-64 to the age group 80-84. The age specific incidence rate for the age group 60-99 years was 1.40/1000 for females and only 0.66/1000 for males (for both sexes it was 1.08/1000). However, it was not concluded whether such female predominance reflects a 'true' higher prevalence in females, especially as it cannot be explained by differences in 'visual impairment threshold of registration' among the registered persons <sup>219</sup>.

## **7.8 Blindness in Europe**

The predominant cause of blindness in Europe is ARMD where 95% of patients are above the age of 70. ARMD is also the leading cause of blindness in the rest of the established market economies countries <sup>239</sup>. (Also see section 5.10).

### **7.8.1 Blindness in the UK and the Republic of Ireland**

The commonest causes in England & Wales <sup>179</sup> are ARMD, followed by glaucoma, diabetic retinopathy and optic atrophy. ARMD was also responsible for most of the partial sight certification. In the working age group (16-64 years), diabetes mellitus was the most important cause of blindness. In Scotland <sup>76, 188</sup>, the commonest two causes of blindness were also ARMD and glaucoma but cataract formed the third cause. These are followed by diabetic retinopathy and myopic degeneration in Scotland. Recent statistics from Scotland <sup>189</sup> (2004), however, have shown that cataract is no longer important as a cause and has been replaced by diabetic retinopathy as the third most important cause. The same study <sup>189</sup> also showed that the proportion of registration from glaucoma, diabetic retinopathy and myopia have not significantly changed since 1983 <sup>188</sup>.

Significant racial differences were shown to exist in Britain between Asians and the indigenous population. The former were younger at registration, there were significantly fewer registered females and more diabetic retinopathy was seen in the 65+ age group (26.1% vs. 7.8%) compared to the indigenous population who demonstrated more glaucoma (29.3% vs 17.4%). In the younger age group (<30 years), the leading causes for

Asians were retinitis pigmentosa and nystagmus, while for the indigenous population it was congenital cataracts and optic atrophy<sup>274</sup>.

In the Republic of Ireland<sup>190</sup>, the main causes of blindness in 1998 were ARMD, glaucoma (16% each), and cataract was still a registerable cause accounting for 11% of cases. Potentially avoidable blindness accounted for 25% of cases. The treatable causes were glaucoma and diabetic retinopathy in the working population and glaucoma and cataract in the over 65 years of age group.

### **7.8.2 Blindness in Scandinavian Countries**

In the Netherlands<sup>199</sup>, the average figures on the prevalence of blindness ranged from 0.1% in subjects aged 55-64 years to 3.9% in subjects aged 85 and more. The prevalence of visual impairment ranged from 0.1% to 11.8%. For persons age 75 years and above, ARMD was the major cause of blindness and for persons younger than 75 years, myopic degeneration and optic atrophy were the predominant causes.

In neighbouring Denmark<sup>218, 220</sup>, ARMD accounted for 60-71.4% of all blind persons; diabetic retinopathy came second (8.4%), and glaucoma third (5%). In the age group 20-59 years, diabetic retinopathy formed the major cause (36%) followed by lesion of the optic pathways (26%), myopia and retinitis pigmentosa (5% each); but in another study<sup>469</sup>, myopia was the main cause of visual disability followed by diabetic retinopathy, optic neuropathy, and RP in the same age group. The prevalence of SVI/BL in the latter study was 0.20% which rose significantly with age.

In Finland<sup>212, 213</sup>, ARMD, glaucoma and cataract were the commonest causes of blindness in the 70 years and older population, with a prevalence of 4.6%, 1.5% and 1.3% respectively. ARMD and cataract were simultaneously present in 2.1%. Diabetic maculopathy was present in 0.6% of the same population. A similar pattern was found in Greenland<sup>465</sup>.

### **7.8.3 Blindness in Germany**

In a review of all the 35 studies covering more than 100 years of German literature on the aetiology of blindness in Germany, Krumpaszky<sup>208</sup> detected 3 trends in the prevalence of blindness, with a current ratio of 1.38/1000. Conditions that showed an increase in the relative frequency were

ARMD (15-20%), high myopia (12-17%) and diabetes (5-7%); whilst glaucoma (15%), retinal degenerations (5-10%) and retinal detachment (5-10%) were found to be stable in a historical perspective. Conditions which have diminished were cataract (5-10%), optic atrophy (5-10%), trauma (<5%), uveitis (<5%) and infections (only a single case). From this equilibrium, 3 causes emerged as the predominant causes namely; ARMD followed by glaucoma and high myopia. On the other hand, infections, trauma and uveitis have virtually disappeared.

Several regional studies on the causation of blindness also exists in Germany<sup>192-197, 669</sup>. All show ARMD as the prime cause of blindness. The proportions of the commonest causes, which had remained unchanged in 20 years, were ARMD (23.1%) and glaucoma (22%) followed by optic atrophy (19.1%), diabetic retinopathy (13.3%) and tapetoretinal degenerations - retinal dystrophies(8.1%)<sup>195-196</sup>. Regional variations existed for eg cataract was not reported as a cause in Baden<sup>192</sup> or Hessia<sup>194</sup> and in Bavaria<sup>197, 669</sup>, RP was the third commonest cause. Prevalence of blindness from diabetes was 0.032/1000 in the total West German population and 0.60/1000 in the diabetic population; representing a drop by one third in recent years<sup>207</sup>.

#### **7.8.4 Blindness in Italy**

In Italy<sup>76, 462</sup>, however, retinal disorders come first followed by cataract, optic nerve disorders and finally corneal opacities and uveal disorders. Nicolosi et al found<sup>462</sup> significant regional variations with a north/south divide with more preventable blindness in the south. The prevalence climbed from 3.2/1000 in the north, to 5.6/1000 in the centre reaching 6.5/1000 in the south, and averaging 4.5/1000 for all Italy. Welfare recipients had increased by 40% in just 5 years between 1984 and 1989, predominantly in the south by an average of 3 folds more than that in the north. The causations also follow this divide, with cataract being the main cause rather than retinal condition in both Sicily<sup>461</sup> and central Italy<sup>461</sup>. Myopia and diabetic retinopathy follow in both regions in the 45 to 69 years old.

#### **7.8.5 Blindness in Bulgaria and Slovakia**



A study from Bulgaria and Slovakia <sup>76</sup> demonstrated another demarcation in the aetiologies. In both, cataract ranked first, but in the second rank came ARMD and myopia in each country respectively, whilst ARMD scored fifth in Slovakia. Glaucoma ranked third in both countries. Diabetic retinopathy was the 5<sup>th</sup> and 4<sup>th</sup> in Bulgaria and Slovakia respectively with optic atrophy reported only in the former as the 4<sup>th</sup> important cause. Yet in the latter, cataract was followed by myopia, glaucoma, diabetic retinopathy and ARMD <sup>76</sup>. Cataract was the main visual morbidity in Bulgaria affecting the population aged 40 and above. The prevalence of blindness in the same population was 0.49% and SVI 0.83% <sup>216, 217</sup>.

## **7.9 Blindness in America**

### **7.9.1 Epidemiological Studies in the US**

In the USA, epidemiological studies on blindness have concentrated on the north-eastern part of the country including, Framingham, Massachusetts; Baltimore, Maryland; Salisbury, New England; and Beaver Dam, Wisconsin, with a lack of nationwide studies and data on blindness <sup>472-481</sup>. The majority of publications on the subject stemmed from the famous Framingham Heart Study in 1948 with some 41 publications on ophthalmic condition out of the total of 1288 papers that centred on, so far, three generations of the original cohort of 5209 patients <sup>482</sup>.

### **7.9.2 Racial Differences in Blindness in the USA**

The pattern of blindness in the USA appears to be different among Whites and Blacks. Whites are far more likely to have ARMD, and Blacks to have primary open-angle glaucoma <sup>478</sup>. The former, as is the case in Europe, is the commonest cause, which contributes to 54.4% of cases of blindness <sup>472</sup>.

Among the Black population, more than half of those with visual disability had conditions that were either surgically treatable or potentially preventable <sup>476</sup>. In general, cataract and glaucoma accounted for more than 60% of blindness with a two-fold excess prevalence of all types of visual impairment in Blacks than in Whites <sup>472</sup>. This disparity is demonstrated in the rates of SVI/blind (<6/60), being 2.7% vs 1.1% in cases with cataract or posterior capsular opacification, 0.9% vs 0.1% in glaucoma cases, and 1.2% vs

0.2% in diabetic retinopathy respectively<sup>476</sup>. Refractive errors were also more predominant in the Black population with over 50% of subjects improving their presenting vision after refractive correction; 7.5% of the improvement was by three or more lines. This demarcation between White and Black populations was applicable all over the USA<sup>472</sup>. The prevalence of blindness was also high among some rural communities such as the Appalachians in the rural valleys of Kentucky with nearly twice the national rates<sup>475</sup>.

Quingly reported that POAG was also the leading cause of blindness in the Hispanic population and its prevalence is intermediate between reported values for the White and Blacks. The prevalence increased more rapidly with increasing age in this population than in other ethnic groups<sup>660</sup>.

### **7.9.3 Characteristics of Blindness in the Blacks and Non-White Groups in the USA**

In the Black population, there is a high prevalence of cortical opacities which remains largely unexplained, and this was concurrent with diabetes, hypertension, and abdominal obesity, which are also common in this and other black populations<sup>658</sup>.

The pattern of POAG in the Black population was also different. This was evaluated by Racette who highlighted the following racial differences in the Black population:

- (a) Its prevalence is six times higher in certain age groups as compared to Whites;
- (b) It is more likely to result in irreversible blindness, appearing approximately 10 years earlier, and progresses more rapidly than in Whites.
- (c) Optic discs are larger than in Whites;
- (d) Intraocular pressure measurements may be underestimated in blacks, possibly because they have thinner corneas;
- (e) There is a higher concurrent occurrence of glaucoma with systemic hypertension and diabetes in the Black population, although no causal relationship has been established between them;
- (f) Blacks are less responsive to both drug and surgical treatment for POAG;

- (g) Blacks have reduced accessibility to glaucoma treatment and are less aware of the risks of having the disease <sup>659</sup>.

In a recent study of a predominantly non-White and uninsured community in southern USA, Apte et al <sup>657</sup> found that retinal diseases, especially retinal vascular occlusions and retinal detachments, were the leading causes of SVI/blindness in this population. Trauma was a significant cause of severe unilateral vision loss, especially in the young, and in newly presenting patients indicating a rising trend. Diabetes was the leading cause of SVI/blindness in the 40-59 years old population; whilst ARMD was an insignificant cause of blindness in this population.

As a cause of low vision (<6/12), cataract was the leading cause being responsible for nearly 50% of bilateral cases in all racial groups including White, Black, and Hispanics.

#### **7.9.4 Prevalence of Blindness in the US**

Based on demographics from the 2000 US Census, an estimated 937,000 (0.78%) of Americans older than 40 years were blind (<6/60) with an additional 2.4 million (1.98%) having low vision (<6/12) <sup>292</sup>. The prevalence of blindness (<3/60) in a rural Appalachian community was 0.44% and of monocular blindness (<3/60) was 3.3%, approximately twice the national rates <sup>475</sup>. The number of blind persons in the USA is projected to increase by 70% to 1.6 million by 2020 with a similar rise projected for low vision owing largely to the aging of the US population <sup>292, 643</sup>.

#### **7.9.5 Factors Influencing Disabilities in the USA**

Factors influencing visual disabilities in the USA were age, race, general health status, educational level, income, and employment status. The observed association of race with blindness and visual impairment was reduced, but not eliminated, after adjustment for these socioeconomic factors, indicating that socioeconomic status itself is an important determinant of visual impairment <sup>477</sup>. Risk factor analysis revealed younger age, higher education, active employment, access to a health care facility, and comprehensive health insurance coverage to be inversely associated with visual impairment <sup>475</sup>. The high rate of unoperated cataracts among younger Blacks

and among elderly subjects of both races suggests that health services are underused. In the urban population half of all blindness is considered preventable or reversible <sup>478</sup>.

## **7.10 Latin America and the Caribbean (LAC)**

### **7.10.1 Prevalence of Blindness**

There have been advances in health care in the last decade achieved by an increase in the per capita public expenditure on health care in many of these countries. Despite these improvements, it is estimated that for every million population in Latin America and the Caribbean, 5,000 are blind and 20,000 are visually impaired; and at least 66% of the blindness is attributable to treatable conditions such as cataract.

A study of visual problems in the Afro-Caribbean population of Barbados found a high prevalence of visual impairment in this population especially in the older age groups and the Blacks. Among the leading causes were cataract, POAG, and diabetic retinopathy <sup>661</sup>.

### **7.10.2 Cataract in LAC**

The cataract surgery rate in Latin America remains low as compared to the industrialised countries, although it is higher than many other regions of the world. The availability of eye care services varies from country to country within the region, and the number of ophthalmologists per million population in the richest countries may be nine times more than in the poorest. Access to health services is problematic in countries with isolated areas in the rainforest or high mountains, poor road systems, or lack of public transportation. Affordability is an important issue that limits utilization of services by the poorest segments of the population in nearly all the LAC and the Caribbean <sup>319</sup>.

### **7.10.3 Trachoma in LAC**

Trachoma is endemic in parts of Latin America such as some rural areas in Brazil, in particular the north-western part of Sao Paulo state <sup>321</sup> and the Brazilian rain forest regions (south of Brazil). In the former, the prevalence of inflammatory trachoma was found to be 6.3%, peaking at 24.1% in the 4 year-old age group. The prevalence of trachomatous

scarring was 2.7%, being more prevalent in older children. In the Yanomami tribes, considered one of the last primitive groups of Indians who live in villages near the Venezuelan border in the Brazil rain forests, and have no contact with other cultures, 30.3% of the subjects had trachoma. Risk factors sited in these communities included household sleeping arrangements and nasal discharge <sup>321, 421</sup>.

#### **7.10.4 VAD in LAC**

Vitamin A deficiency has been known to exist in Latin America and the Caribbean since the mid 1960s and its presence in the region is mainly subclinical. The problem is severe in five countries, moderate in six, and mild in four. The national prevalence of this in the <5 years children varied between the countries, ranging from 6% in Panama to 36% in El Salvador. No recent data is available from Chile, Haiti, Paraguay, Uruguay, Venezuela, and the English-speaking Caribbean. The population affected amounts to about 14.5 million children under 5 years of age (25% of that age group). It has also been found that schoolchildren and adult women may also have significant VAD <sup>418</sup>. In Brazil VAD is highly prevalent, though only mild, in various age groups <sup>412</sup>. This is a great improvement in comparison to some 26 years ago when xerophthalmia was a serious health problem in some parts of this country causing blindness in areas such as the Northeast. Around 1,000 pre-school age children were recorded as blind from the condition in a 1-year period at that time <sup>413</sup>.

The actions currently implemented to control VAD in this region are: (1) universal or targeted supplementation, with sustained high coverage rates through national immunization days in some countries; (2) sugar fortification, and (3) limited dietary diversification activities <sup>418</sup>.

#### **7.10.5 Onchocerciasis in LAC**

Onchocerciasis, which originally came from Africa, is also known in Latin America. It was first discovered in Guatemala in 1917, and later was recorded in Mexico, Venezuela, Colombia and Brazil. The disease was re-assessed in northern Ecuador <sup>420</sup> in 3 studies in the 1980s. In 1989, it was found to have increased and dispersed considerably in comparison to earlier studies which highlighted the danger of the formation of new foci of the dis-

ease in areas currently free of the disease. This was attributed to the migration of infected individuals and the presence of a highly efficient vector <sup>419</sup>.

## **7.11 Blindness in Australia**

### **7.11.1 Prevalence and Racial Differences**

In Australia, the pattern of visual disability is also influenced by ethnicity <sup>454-456</sup>. In the non-Aborigines, age-related conditions are the main causes of visual impairment, as found in a study conducted on 2115 persons aged 50 and above from various local government regions in South Australia <sup>454</sup>. However, unlike Western Europe and the White population in the USA, cataract was the principle cause followed by ARMD. The prevalence of monocular and binocular blindness in this population was estimated to be 3.7% and 1.3%, respectively. These rates increase significantly in the 70 years of age and over subgroups. The number of visually impaired persons in South Australia is expected to increase over the coming decades.

In the Blue Mountains region, located west of Sydney in South East Australia <sup>457</sup>, a study in a well-defined urban population 49 years of age and older, showed refractive errors to be common among the population, and refraction improved visual acuity by one or more lines in 45% of participants, and by three or more lines in an additional 13%. SVI/blindness was found in 0.7% of the sample, which increased 52 fold from 0.8% of persons 49-54 years of age, to 42% of persons 85 years of age or older. Females formed 79% of patients with SVI. ARMD was the cause of SVI/blindness in 21 of the 24 persons.

### **7.11.2 Blindness in the Aborigines**

The picture is different in the Aborigines who have rates of blindness comparable to those seen in developing countries. This is despite the improvement in health care services in the preceding 15 years in Central Australia, which had led to a reduction in the prevalence of visual disability in rural Aborigines. Low vision and blindness occurred in 19.6% and 10.4% of 60+ year olds, respectively, and again was more predominant in women <sup>456</sup>.

## **7.12 Blindness in Japan**

In Japan<sup>288</sup> newly registered visually handicapped patients at the Tokyo Metropolitan Rehabilitation Centre for the physically and Mentally Handicapped were compared in 3 10-years intervals between 1968 (when the facility was opened), 1978, and 1988. Examinations were carried out by the same physicians and diagnoses were made by uniform criteria. Since approximately 10% of the total population of Japan lives in Tokyo, the statistics on the causes of visual handicaps in this area were thought to be representative. The changes observed over the past twenty years were grouped into 3 categories. Conditions which remained almost static included high myopia, retinal degeneration and senile cataract; conditions which have decreased included corneal opacity, retinopathy of prematurity, congenital cataract and optic atrophy; those which had increased included diabetic retinopathy, glaucoma and retinal macular degeneration. Advances in medical treatment and the shift into an ageing society in Japan were the reasons given for the changes observed.

## **7.13 Blindness in Asia**

### **7.13.1 Prevalence**

Only a few population-based data on the prevalence and causes of visual impairment are available from East Asia. However it is well recognised that the prevalence of blindness in Asia averages 0.75/1000, ie second to Africa.

### **7.13.2 Blindness in India**

Cataract is a major cause of blindness in India<sup>267-271, 287</sup>. There is also a significant burden of corneal blindness in the population of southern India, 95% of which is avoidable, and this was significantly higher with increasing age and decreasing socioeconomic status. Reports from the state of Andhra Pradesh<sup>268, 270</sup> indicate that the most frequent causes of corneal blindness included keratitis during childhood (36.7%), trauma (28.6%), and keratitis during adulthood (17.7%). Corneal blindness was associated with gross impairment of visual acuity with nearly half of the cases having poor light projection to NLP. In Tirunelveli district<sup>269</sup>, cataract was the principal cause of blindness in at least one eye in 70.6% of blind people. Presenting blindness was associated with older age, female sex, and illiteracy. Surgical

coverage was inversely associated with illiteracy and with female sex in rural areas. The prevalence of cataract surgery was 11.8%, with an estimated 56.5% of the cataract blind already operated on with 63% pseudophakic.

Refractive error, including uncorrected aphakia, was the main cause of visual impairment in cataract-operated eyes. Vision of <6/18 was associated with cataract surgery performed in government facilities, as opposed to that in non-governmental/private facilities. Age, sex, literacy, and area of residence were not predictors of visual outcomes. In addition there is a large burden of moderate visual impairment, the majority of which is due to relatively easily treatable refractive error and cataract. Extrapolation of these data to the population of India suggests that there were 82 million people with moderate visual impairment in the year 2000, and this number is likely to be 139 million by the year 2020 if the current trend continues<sup>270</sup>. Similar trends were reported in rural northwest India<sup>271</sup>.

In respect of the refractive errors, in over 70% of subjects aged 40 years and over examined in rural communities in three districts of Tamil Nadu in southern India, refraction improved the sight by at least one line, and in nearly a third by 3 lines. Age-related cataract was the most common potentially reversible blinding disorder (72.0%). Among persons 40 years of age and older, blindness was present in 1.0% and SVI/blindness in 2.1% of corrected eyes. This confirmed that cataracts and refractive errors have remained the major reversible causes of vision impairment in the rural population<sup>448</sup>.

### **7.13.3 Blindness in Bangladesh**

In Bangladesh<sup>273</sup>, the main causes of low vision in >30 years were cataract (74.2%), refractive error (18.7%), and macular degeneration (1.9%). Cataract was the predominant cause (79.6%) of bilateral blindness followed by uncorrected aphakia (6.2%) and macular degeneration (3.1%). This amounts to some 650,000 blind adults which highlights the need for a national plan for the delivery of effective eye care services, aimed principally at resolving the large cataract backlog and the inordinate burden of refractive error.



#### **7.13.4 Blindness in Nepal**

In Nepal <sup>278</sup>, a national eye care programme was launched in the early 1980s. Following this programme there was a possibility of some reduction in the overall prevalence of blindness and some increase in the cataract coverage. However, despite this, blindness remains high. An important element of progress in Nepal is the disappearance of trachoma from the Western region. This was due to a secular trend rather than to antibiotic treatment programme, which had not been used for over a year from the time of the survey <sup>401</sup>.

#### **7.13.5 Blindness in Indonesia**

In Indonesia <sup>272</sup> the rates of habitual low vision and blindness in provincial Sumatra, Indonesia, are similar to other developing rural countries in Asia. Blindness is largely preventable, as the major contributing causes (cataract and uncorrected refractive error) are amenable to treatment. The overall prevalence rate of bilateral low vision was 5.8% and bilateral blindness was 2.2%. The rates of low vision and blindness increased with age. The major contributing causes for bilateral low vision were cataract (61.3%), uncorrected refractive error (12.9%), and amblyopia (12.9%), and the major cause of bilateral blindness was cataract (62.5%). In unilateral low vision, the major causes were cataract (48.0%) and uncorrected refractive error (12.0%), and major causes of unilateral blindness were amblyopia (50.0%) and trauma (50.0%).

#### **7.13.6 Blindness in Malaysia**

In Malaysia, two epidemiological studies have been conducted <sup>276, 557</sup>. The country is multiracial with 4 main ethnic groups who are; the Malay race (49%), Chinese (27%), indigenous people (13%), Indians (8%), and other races (3%). About 53% of the population lives in rural areas with 12% over 50 years of age; the M/F ratio is 1:1. In a national eye survey conducted by Zainal et al in 1996, the prevalence of bilateral blindness was 0.29% and that of low vision 2.44%. Females had a higher age adjusted prevalence of low vision compared to males. No significant differences in the prevalence were found among the four ethnic groups, or urban and rural residents. Cataract was the leading cause of blindness (39%) followed by

retinal diseases (24%). Uncorrected refractive errors (48%) and cataract (36%) were the major causes of low vision. These results are found to be comparable with other countries in the South East Asia region. The accessibility and availability of eye care services were thought to be contributors to the high prevalence of treatable conditions such as cataract and refractive errors<sup>557</sup>. The other study<sup>276</sup> concentrated on the adult rural Malay population in the district of Kuala Selangor. Age was the most important factor associated with the prevalence, but gender, level of education, and level of income were not significantly related. This study highlighted the significance of diabetic retinopathy as the second important cause.

## **7.14 Blindness in the Western Pacific**

### **7.14.1 Prevalence of Blindness**

The Western Pacific region, containing the most populous country, China, and many small Pacific island countries, is one of great diversity with different stages of development in the delivery of eye care services with changing trends in some countries. It was estimated in 1998 that this region harbours over 20% of the world's blindness with some 8 million blind people, about 80% of whom are in China, the Philippines and Vietnam. Prevalence rates are reported to be in the range 0.5% to just over 1%. The WHO has established a long-term objective in this region of reducing national blindness rates to less than 0.5%, with no more than 1% in any part of the country<sup>261, 574</sup>.

### **7.14.2 Blindness in Vietnam**

In Vietnam<sup>289</sup>, a study in 1991 showed cataract to be the main blinding disease. Trachoma and xerophthalmia were also very common. A prevention programme against blindness in central areas of Vietnam was set up and was combined with improvements in the operating facilities. A higher number of cataract operations have been performed since.

### **7.14.3 Blindness in Cambodia**

In the northwest of Cambodia<sup>282</sup> two hospital based studies in a provincial hospital in 1994 and 1997 identified cataract as the main cause of blindness in 59% to 69% of adults<sup>281-282</sup>. The rate of blindness from surgical

complication was 3.3% in one study<sup>282</sup>. Glaucoma blindness accounted for 14% of cases and 11.5% of patients had corneal scars, 2.5% of which was due to trachoma. Bilateral trauma, usually due to landmine injuries, accounted for 4% of cases.

In the rural areas of Cambodia, the prevalence of blindness was estimated as 6.7%, unilateral blindness 19%, and visual impairment (<6/18) 12%. Trachoma was diagnosed in 13% of patients, several of whom needed lid surgery for trichiasis. It was concluded that there was little prospect of making substantial inroads into the backlog of avoidable blindness in the foreseeable future because of the difficult practical and political situation in the country<sup>281</sup>.

Ophthalmological services were inadequate in Cambodia for the vast majority of people living outside the capital Phnom Penh. The need to train general doctors to surgically manage patients with visual loss from cataract and glaucoma, which together accounted for 70% of all cases of blindness, has been stressed, together with the need for large population-based surveys<sup>282</sup>.

An additional important causation of blindness exists in countries such as Cambodia, which have high landmine densities<sup>284</sup>. Penetrating ocular trauma is a significant cause of bilateral blindness in Cambodia, and predominantly affects young men. Cambodia has an estimated 4-10 million landmines that cause significant morbidity and mortality. This hospital-based study of blindness in the northwest of Cambodia found that of 453 bilaterally blind individuals, 17 (4%) were blind as a result of trauma, and 14 of these were males aged 15-35 years old. Fourteen cases were due to bilateral penetrating injuries caused by landmine explosions, and usually occurred in association with other severe injury (2.2.9).

#### **7.14.4 Blindness in the Republic of China**

In China, according to the National Sample Survey<sup>264</sup> of Blindness and Low Vision, the prevalence of blindness is 0.43%, resulting chiefly from cataract, which was found to be the leading cause of blindness in all the studies conducted in this country<sup>258, 260, 262, 264, 265</sup>. It was lowest (37.5%) in Beijing<sup>260</sup> and highest in Tibet<sup>259</sup> and Yunnan province<sup>262</sup> (52%). The second most common cause varied regionally being glaucoma in Beijing<sup>260</sup>,

macular degeneration in Tibet<sup>259</sup>, corneal diseases (trachoma) in Hebei province<sup>265</sup>, and ocular injuries in Genjiu city, Yunnan province<sup>262</sup>. Myopic degeneration is also an important cause in China. Blindness was considered a serious public health problem in Tibet<sup>259</sup>, with a prevalence higher than in similar studies in eastern China. As elsewhere in the world, women have an excess burden of blindness compared to men. About 75% of blindness in Tibet can be either prevented or treated. In the Beijing<sup>260</sup> region in patients aged 40 and over, the prevalence rates of blindness and impaired vision was two folds higher in rural areas (1.06%) than among urban residents (0.52%). The prevalence rate of blindness in females was (0.64%), double that of males (0.37%). The prevalence of blindness is associated with the aboriginal, occupation, age and sex<sup>262</sup>, health care level, educational level, and environmental factors<sup>260</sup>.

#### **7.14.5 Blindness in Taiwan**

The rate of blindness in Taiwan is close to that reported for other developed countries. The high frequency of myopic macular degeneration as a major cause of visual loss, however, is not observed in European-derived populations. The leading causes of visual impairment in Taiwan<sup>258</sup> were cataract (41.7%), followed by myopic macular degeneration (12.5%) and ARMD (10.4%). The rate of blindness was estimated to be 0.59% (65-91 years of age, mean 72.2 years). There was a significant increase in the rate of low vision from 0.83% at 65 to 69 years of age, to 8.33% at age 80 years or older. There was no gender difference in the prevalence of blindness or low vision.

#### **7.14.6 Blindness in Hong Kong**

In Hong Kong<sup>263</sup>, blindness and visual disability are common in this socio-economically advanced population; most of it easily remedied. This was attributed to a rapidly ageing population. Visual impairment with either eye <6/18, increased with advancing age and was more prevalent in males, the less educated, and those living in public housing estates. The prevalence of cataract surgery was 9.1% and was commoner in the less educated people.

#### **7.14.7 Blindness in Mongolia**

In Mongolia <sup>285</sup>, a survey was conducted in 3 out of the 18 administrative regions (aimaks) on people aged 40 years and above. The prevalence of blindness and low vision in the sample were 1.5% and 8.1%, respectively, from which the prevalence of blindness and low vision in the Mongolian population aged 40 years and older were estimated to be 1.4% and 7.7% respectively. The prevalence of climatic droplet keratopathy was high (ranging from 15% to 50%) in this population, which included a large number of semi-nomadic cattle breeders, and was responsible for 7.2% of the blindness and 19.3% of the low vision. Cataract and glaucoma were the commonest blinding disorders, each accounting for around 35% of the blindness. Trauma accounts for a high proportion of those monocularly blind. Trachoma and xerophthalmia were not found.

#### **7.14.8 Blindness in Singapore**

Singapore <sup>279, 280, 451</sup> has witnessed changing trends in the major causes of blindness and visual impairment over the past four decades. A system of blind registration was established in 1950 and is managed by the Singapore Association of Visually Handicapped <sup>280</sup>. The impact of improvements in the economic and social environment resulting in better health services and the prevention of avoidable diseases is echoed in the pattern of blindness in the country; this is parallel to that observed in the developed countries, that is a shift from infectious to congenital and age-related causes. In 1995, retinal diseases were the main cause (57.6%), followed by congenital and developmental disorders (14.7%), optic atrophy (9.3%), glaucoma (8.6%) and minor causes (1%). In 1989, cataract, diabetic retinopathy and refractive errors were cited among the important causes of visual disability <sup>290</sup>.

The pattern of corneal disorders in Singapore is different from that seen in western countries, and in the developing countries. Dendritic corneal ulceration, keratoconus and corneal dystrophy were relatively uncommon. Bullous keratopathy, however, was important contributor in the 1980s due mainly to the increasing number of cataract operations done and to the use of intraocular implants. Other major corneal disorders in Singapore are exposure keratitis and neurotrophic keratitis <sup>290</sup>. Another study <sup>451</sup> to determine the prevalence rates of blindness and visual

impairment in people aged 60 years and above, and to determine the rate of undiagnosed eye diseases, was conducted by using email to invite patients to attend a screening programme and had a response rate of 22.2%. The prevalence rates for blindness and visual impairment in this age group were 3.0% and 15.2% respectively. The prevalence rates for cataract, age-related macular degeneration, glaucoma and diabetic retinopathy were 78.6%, 27.0%, 5.7% and 5.1% respectively. The study revealed the magnitude of undiagnosed pathologies in the sample; for every person known to have cataract, 2 were unknown; for every person with ARMD, 154 were unknown. None of the 29 persons with diabetic retinopathy was diagnosed previously. A total of 20% of those screened had various degrees of visual disability.

#### **7.14.9 Blindness in Tonga**

A study in Tonga, which comprises 171 islands spread across 700,000 sq km of ocean<sup>441</sup>, was conducted to evaluate the prevalence and causes of blindness and visual impairment among 4056 Polynesians aged 20 years and over. The study showed that visual problems do not constitute a health problem by world standards. The prevalence of bilateral blindness was 0.56% and all affected were aged over 50 years. Monocular blindness was three times more frequent. Cataract was responsible for 68.4% of bilateral, and 30.3% of monocular blindness. Corneal opacity from infection or trauma, and diabetes were responsible for most of the remaining visual impairment. In Vanuatu<sup>452</sup>, in a sample of 3520 persons (population 150,000 at the time of the study) aged 6 and above, an overall prevalence of blindness of 4.0/1000 was found. Cataract formed 85% of cases.

#### **7.14.10 Summary of the Blindness in Asia**

In summary, the leading causes of blindness in Asia are cataract, ocular trauma and glaucoma are<sup>261, 574</sup>. Trachoma, in most countries of the region, is no longer considered a public health problem as a result of the improvements in socioeconomic and environmental conditions and better personal hygiene which have significantly reduced the prevalence of the disease. In Vietnam alone, with a population of about 64 millions, nearly 11 million people had trachoma. Surveys carried out in Cambodia in 1996, in

Mongolia in 1991–1992, and in Papua New Guinea in 1979–1980 showed declining prevalence of this condition.

## **7.15 Sub-Saharan Africa**

### **7.15.1 Prevalence of Blindness in SSA**

The prevalence rates of blindness vary widely but the evidence suggests that approximately 1% of Africans are blind. The highest figures are from the Gurage zone in central Ethiopia (7.9%)<sup>644</sup>, followed by Zambia (3.6%)<sup>311</sup>, Liberia (3.24%)<sup>317</sup>, Niger 2.6% (range 1.14-8%)<sup>302, 309</sup>, Central African Republic (2.2%)<sup>581</sup>, Mali<sup>301</sup> and central Ghana (1.7% each)<sup>302</sup>, Ethiopia (1.5%)<sup>416</sup>, Sierra Leon (1.3%)<sup>316</sup>, Kwazulu (1%)<sup>304</sup>, Togo (0.82%)<sup>310</sup>, Kenya (0.7%)<sup>307</sup>, Benin (0.6%)<sup>296</sup>, Northern Transvaal (0.57%)<sup>445</sup>, Congo (0.3%)<sup>309</sup>, and the lowest in Oyo state, Nigeria (0.15%)<sup>300</sup>. In Tanzania, 65% of this bilateral blindness and 46% of monocular blindness are preventable or reversible as found in Tanzania<sup>255</sup>.

### **7.15.2 Major Causes of Blindness in SSA**

The major causes of blindness in Sub-Saharan Africa are cataract, trachoma and glaucoma<sup>295</sup>. The contribution of each of the factors differs in various parts of the regions. In East Africa<sup>254</sup>, in people > 60 years old, the shares of these conditions were 50%, 16% 12% respectively.

### **7.15.3 Size of the Cataract Problem in SSA**

It is estimated that among the 17 million blind from cataract in the world, 2-3 millions live in Africa<sup>313</sup>. The proportion of this problem differs in the various regions<sup>293-318</sup>. It is the commonest cause in all these countries with the exception of Benin<sup>296</sup>, where it is only a cause of visual impairment. The highest prevalence of cataract is in the Congo<sup>309</sup> (81%) followed by central Ghana<sup>302</sup>, Bioko, Guinea<sup>294</sup> and Kwazulu<sup>304</sup> (59% to 62.5%) and the lowest is in Tanzania (22%)<sup>255</sup>. In between lie a whole range of countries including Niger<sup>293</sup>, Benin<sup>296</sup>, Zaire (south-western equatorial region)<sup>299</sup>, and Mali<sup>301</sup> (54% each), and East Africa<sup>298</sup> (50%). Nigeria (44 to 48%)<sup>221, 300, 303, 318, 584, 591</sup>, rural Kenya<sup>307, 234</sup>, Sierra Leon<sup>316</sup>, Cameroon<sup>230, 305</sup>, Togo<sup>310</sup>, Liberia<sup>317</sup> (38%-44.2%).

Cataract blindness appears to have increased in the last 2 decades in some countries such as Zaire<sup>315</sup> where cataract formed 18.4% of the causes in 1984 rising to 54% in 1996. Cataract surgery can be accompanied by poor outcome as has been shown in Malawi which was attributed mainly to surgical complications and partly a lack of aphakic correction<sup>402</sup>. In south west Uganda, however, cataract (together with refractive error) are only major causes of incident visual loss rather than blindness<sup>666</sup>.

#### **7.15.4 Corneal Blindness in SSA**

Corneal blindness is another major cause of visual morbidity in Africa accounting for 44% of blindness in some areas; the majority are potentially preventable or treatable<sup>255</sup>. The overall prevalence of bilateral corneal opacification is 1.16% and unilateral corneal opacification is 2.07%. This is most frequently associated with trachoma, keratoconjunctivitis, VAD/measles and the use of TEM. Unilateral corneal opacification had similar causes with the addition of cases caused by trauma<sup>295, 255</sup>.

#### **7.15.5 Trachoma in SSA**

Trachoma prevails in different proportions in the various regions; 17% in northern Nigeria<sup>293, 312</sup>, 16% in East Africa<sup>298</sup>, 5% in southeast Zaire<sup>299</sup>, 3% in Sierra Leon<sup>316</sup>. It is also a cause of blindness in Mali<sup>301</sup>, Ghana<sup>301</sup>, and Gambia<sup>297</sup>. It is the second commonest cause of blindness in these countries except in Sierra Leon (the 5<sup>th</sup> place) and southwest Zaire. In Gambia<sup>297</sup> active trachoma is found in 3% of the population in all ages with 5.9% presence in the 0-9 years age group.

#### **7.15.6 Blindness in East Africa**

In Kenya<sup>132-133, 234, 304, 307, 408</sup>, trachoma prevalence showed significant regional variations with high prevalence associated with high climatic aridity (57-63%), and lower prevalence is associated with areas of greater rainfall, sustainable agriculture, and a higher general standard of living (1%). Wide intra regional variations were also found in age-specific prevalence (38% in <3 years, 11% in >60 years) and in the severity of the disease within the high-risk regions. Active trachoma was present in 19% of all the series and 50% of all those with trachoma were found to have moderate to severe



inflammation. Potentially blinding eyelid deformities secondary to chronic trachoma occurred in 5.0% of the rural population, and was more prevalent in females of all ages than in males. The prevalence rate of visual impairment from the condition (< 6/18) was 7.2/1000.

In central Tanzania, corneal scars from trachoma, VAD, and the use of traditional medicines were responsible for 44% and 39% of bilateral and monocular blindness respectively<sup>255</sup>. Corneal opacities were also important in Kenya ranking as the second most important cause of visual disability<sup>234</sup>.

In the Central African Republic, onchocerciasis is responsible for the majority of visual loss (73.1%), followed by cataract (16.4%), trachoma (4.5%), and glaucoma (2.2%). It was estimated that 95.5% of all blindness in this population could have been prevented or successfully treated<sup>581</sup>.

#### **7.15.7 Blindness in Ethiopia**

In Ethiopia, trachoma is a significant health hazard with several endemic areas. According to a survey conducted in collaboration with the WHO in 1981, trachoma was the leading cause of blindness, especially in rural areas, for 42% of blindness, followed by cataract (29%). The prevalence of blindness differs considerably in the various parts of the country with figures on its prevalence ranging from 1.5%, to as high as 7.9% in the Gurage zone in central Ethiopia. In the latter region, visual impairment (<6/18) is as high as 12.1% and monocular blindness was found in 16.3% of the people; all increased with age. Women were affected 1.8 times more than men<sup>415, 580, 644</sup>. North-western Ethiopia is another trachoma endemic region with a 59.2% overall prevalence rate of the disease and 52.4% prevalence of active trachoma; a higher frequency of the disease is observed among females aged 15 years and above. Child caring among women, habits and frequency of face washing, the presence of cooking places in living rooms and sharing of same rooms with animals have been found to be strongly associated with trachoma<sup>416</sup>.

In recent years, cataract surpassed trachoma as a leading cause in Ethiopia accounting for 46.1% of blindness compared to 22.9% caused by trachoma; glaucoma came third (7.6%)<sup>415, 580, 644</sup>. The prevalence of vision reducing cataract increased with age, whilst that of trachoma related visual

loss did not; suggesting that trichiasis related visual loss in this population might not be cumulative <sup>415</sup>.

#### **7.15.8 Glaucoma in SSA**

Glaucoma is another important, and common, cause of blindness in Africa and ranks as second and third among the causes of blindness in most of the countries. The highest prevalence is reported at 30% in Zaire <sup>299, 315</sup> where glaucomatous optic neuropathy were reported in 70% of patients seen in hospitals, <sup>314</sup> and in the 1980s it was the leading cause of blindness in the country <sup>315</sup>. This is followed by Cameroon <sup>305</sup> and Kwalazulu <sup>304</sup> where the prevalence is over 20%; Nigeria <sup>318</sup>, Niger <sup>293</sup>, and east Africa <sup>298</sup>, Bioko, Guinea <sup>294</sup> ranking third and fourth among the causation with prevalences between 10% to 20%. It scored less than 10% in Togo <sup>310</sup>. It is also the third important cause in Sierra Leon <sup>316</sup>, Congo <sup>309</sup>, and central Ghana <sup>302</sup>.

#### **7.15.9 Onchocerciasis in SSA**

Onchocerciasis has been reported in various proportions. In West Africa, two types have been described; a Sudan-savannah and a rain forest onchocerciasis. These two patterns of onchocerciasis have in common many epidemiological features but their clinical manifestations vary. In the savannah type, the prevalence of serious ocular lesions and blindness are much higher than in rain-forest type. This has been attributed to several factors including those related to the vectors, onchocerca-simulium couples, different *Onchocerca volvulus* strains, factors related to the human-host, and others such as nutritional factors, concomitant ocular infections, luminousness of savannah, and periods of transmission. It was concluded that the main difference between savannah and rain-forest onchocerciasis may be the degrees in pathogenicity of different strains of *Onchocerca volvulus* <sup>379</sup>. In some parts of West Africa, approximately 30% of blindness can be attributed to onchocerciasis <sup>491</sup>.

The contribution of onchocerciasis to ocular morbidity in Africa varies in the different endemic areas. In some villages in Sierra Leon <sup>371</sup>, the overall prevalence of onchocerciasis was reported at between 73% to 78%. In mesoendemic regions of Nigeria, it accounted for up to 54% of blindness from optic nerve lesions <sup>591-592</sup>. In another study it was found to afflict 16.3%

of cases seen in the out patient clinic<sup>314</sup> and came fourth as an important cause of blindness.

Onchocerciasis is the leading cause of blindness in the Central African Republic<sup>581</sup> and comes second in Sierra Leone<sup>316</sup> (30%), Liberia<sup>317</sup> (14%) (mainly from anterior segment complications) and central Ghana<sup>302</sup> (12.5%). It is also present in the Cameroon<sup>305</sup> (8%) and Zaire<sup>315</sup> (4.9%). In the endemic Bioko region of Guinea, the ocular version of the condition is uncommon.

The prevalence of blindness from onchocerciasis was found to be 1.3% in the hyperendemic southern part of Sierra Leon<sup>444</sup>. It also contributed to 4.3% of visual impairment and 3.4% of monocular blindness. In this population, cataract and onchocerciasis are the major causes of visual loss.

Onchocerciasis is also endemic in Uganda where *Simulium neavei* is responsible for about 85% of its transmission. Control programmes date back to the 1950s and relied on spraying blackfly breeding habitats with DDT. This was terminated in 1973 following the ban against the use of DDT; however, renewed efforts were resumed in 1990 in the form of the launching of the National OCP and the mass distribution of ivermectin<sup>414</sup>.

#### **7.15.10 Xerophthalmia in SSA**

The first population-based study of xerophthalmia in Africa, carried out in the Lower Shire River Valley of Malawi in 1983, found the prevalence of active xerophthalmia was 3.9%. The rates for night blindness and active corneal disease were over five times the WHO criterion for problems of public health importance. Xerophthalmic corneal scarring was present at a rate of 5.9/1,000, more than 10 times the WHO criterion causing all cases of bilateral blindness in this age group. The disease was not only a leading cause of blindness in this area, but may have an important impact on child survival as well<sup>439-440</sup>. Xerophthalmia is also a major public health problem in the Cameroon<sup>233</sup>. For onchocerciasis in Sudan, refer to section 8.

#### **7.15.11 Other Causes of Blindness in SSA**

Uveitis was reported as the second cause of blindness in Nigeria in 1974 (28.3%)<sup>318</sup>, the third in both the Cameroon (8.5%)<sup>305</sup> and rural Zaire (6%)<sup>299</sup>. The prevalence in the Cameroon<sup>378</sup> varied from 48% to 89%.

Macular degeneration as a cause of blindness has been reported in a few countries only. It ranked second, third and fourth among the causations of blindness in Bioko, Guinea, Nigeria and Kenya respectively<sup>294, 303, 307</sup>. In Nigeria it contributed to 11% of the blindness.

Trauma is usually reported as a cause of unilateral blindness<sup>621</sup>; in Mali it constituted 43%<sup>301</sup>. It was 14% in the Niger<sup>293</sup> and 14-16.9% in Nigeria<sup>293, 303</sup>. As an important cause of bilateral blindness, Nigeria is the only country in Sub-Saharan Africa where trauma appears as a major cause of bilateral blindness ranking fourth among the causes at 9.9%<sup>312, 318</sup>.

Phthisis bulbi was also commonly reported as a cause of unilateral blindness in Nigeria (17%)<sup>293</sup> and Kenya<sup>307</sup>. It contributes to 9% of cases of bilateral blindness in Liberia<sup>317</sup> forming the third commonest cause, and in Ghana<sup>302</sup> it ranked as the fifth cause.

Cortical causes and disorders of the visual pathways were only reported in the Cameroon<sup>305</sup>, forming the fifth cause of bilateral blindness.

#### **7.15.12 Blindness in South Africa**

In the Northern Transvaal, South Africa, figures from a survey in 1985 of 18,962 persons (26.6% of the estimated 71,200 inhabitants of the district) showed the prevalence of blindness to be 0.57%. The main causes of blindness were senile cataract (55%), corneal scarring due to trachoma (10%), uncorrected aphakia (9%), and open-angle glaucoma (6%). There were 14 aphakic blind persons who did not have aphakia glasses (43% of all persons operated on for cataract). Women had a significantly higher prevalence of blindness than men. After the age of 60 years the prevalence of blindness increased sharply. Women were 1.6 times less likely to have undergone cataract surgery than men<sup>445</sup>.

Trachoma remains the most common cause of preventable blindness in certain areas of the northern Transvaal region. Young children act as the main source of infection within the family indicating that trachoma is a familial disease. Elderly women who have lived in these areas for long periods of time are at greater risk of blindness and impaired vision from the disease<sup>404</sup>.