STATISTICS

Blindness in children: a worldwide perspective

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Children in a school for the blind. KENYA

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Many of the causes of childhood blindness are avoidable, being either preventable or treatable.[1] Only three per cent of the world's blind population are children. However, because children have a lifetime of blindness ahead of them, the number of 'blind person years' resulting from blindness starting in childhood is second only to cataract.[2] Controlling blindness in children is a priority of VISION 2020[3,4]; however, as its causes differ from that of blindness in adults, different strategies, personnel, infrastructure, and equipment are required to combat it. There is also a greater urgency when managing children, as delays in treatment can lead to amblyopia (lazy eye).

Classifying the causes of blindness in children

The World Health Organization's (WHO) system for classifying blindness and low vision in children uses two methods.[5] The first method, a descriptive classification, refers to the anatomical site most affected. The following categories are used:

- whole globe (e.g. anophthalmos, microphthalmos)
- cornea (e.g. corneal scarring, keratoconus)
- lens (e.g. cataract, aphakia)
- uvea (e.g. aniridia)
- retina (e.g. retinal dystrophies)
- optic nerve (e.g. atrophy)
- glaucoma
- conditions where the eye appears normal (e.g. refractive errors, cortical blindness, amblyopia).

The information necessary for this descriptive classification can be collected on every child following examination and clinical assessment.

The second method, an aetiological classification, classifies blindness according to underlying cause. This method uses categories based on the time of onset of the condition:

- hereditary (at conception, e.g. genetic diseases, chromosomal abnormalities)
- intrauterine (during pregnancy, e.g. due to rubella or thalidomide)
- perinatal (e.g. retinopathy of prematurity, birth injury, neonatal conjunctivitis/ophthalmia neonatorum)
- childhood (e.g. vitamin A deficiency disorders, measles, trauma)
- unknown/cannot be determined (e.g. congenital abnormalities).

Information about underlying causes of blindness, although often more difficult to collect, is more useful for planning.

Regional variations

Most data from low- and middle-income countries have come from examining children attending schools for the blind, whereas data from industrialised countries come from multiple sources. Data are available from almost 15,500 children from 38 countries (Tables 1 and 2).

Table 1. Regional variation in childhood blindness: descriptive classification by World Bank region

	Wealthiest region ←							→ Poorest region
	EME	FSE	LAC	MEC	China	India	OAI	SSA
Number of countries	3	4	8	4	1	1	6	11
Number examined	None[a]	504	1,007	1,758	1,131	4,712	2,950	1,748
Estimated no. of blind children	50,000	40,000	100,000	190,000	210,000	270,000	220,000	320,000
Globe (%)	10	12.1	11.0	16.0	25.5	33.3	16.5	8.8
Cornea (%)	1	2.2	8.4	5.8	4.3	24.6	24.3	36.2
Lens (%)	8	10.7	7.4	16.7	18.8	9.7	27.4	10.0
Uvea (%)	2	5.4	2.3	2.7	1.5	4.3	2.3	4.5
Retina (%)	25	44.2	46.5	42.4	24.9	16.6	15.8	20.0
Optic nerve (%)	25	14.7	11.6	7.4	13.6	6.0	7.5	9.5
Glaucoma (%)	1	2.8	8.3	6.4	9.0	2.5	4.6	6.2
Other (%)	28	7.9	4.5	2.6	2.4	3.0	1.6	4.8
Total (%)	100	100	100	100	100	100	100	100

EME = Established Market Economies; FSE = Former Socialist Economies; LAC = Latin America and Caribbean; MEC = Middle Eastern Crescent; OAI = Other Asian Countries and Islands; SSA = Sub-Saharan Africa.
a Data from published studies (1,623 children)

Table 2. Regional variation in childhood blindness: aetiological classification by World Bank region

	Wealthiest region ←							→ Poorest region
	EME	FSE	LAC	MEC	China	India	OAI	SSA
Number of countries	3	4	8	4	1	1	6	11
Number examined	None[b]	504	1,007	1,758	1,131	4,640[c]	2,950	1,748
Estimated no. of blind children	50,000	40,000	100,000	190,000	210,000	270,000	220,000	320,000
Hereditary (%)	45	17.7	22.1	55.1	30.7	19.3	20.1	20.0
Intrauterine (%)	7	5.8	8.1	1.1	0.1	2.7	1.1	2.5
Perinatal (%)	24	27.8	27.8	1.3	2.2	1.5	22.6	5.9
Childhood (%)	10	5.0	9.8	6.1	14.0	21.8	6.2	34.6
Unknown (%)	14	43.7	32.2	36.4	53.0	54.7	50.0	37.0
Total (%)	100	100	100	100	100	100	100	100

b Data from published studies (1,623 chidren) *c* Data not available for 72 children

Most of the data were collected using best corrected visual acuity, as had been recommended by WHO. This meant that blindness due to uncorrected refractive error was not included. Recently, however, the WHO definition of blindness has been changed: it now uses 'presenting visual acuity' rather than 'best corrected visual acuity'. This means that uncorrected refractive errors can now be included as a cause of blindness; hopefully, the corresponding data will be reported in the future.[6]

The data suggest that the causes of blindness in children vary widely from region to region (Table 2). Corneal scarring due to childhood factors (measles, vitamin A deficiency disorders, traditional eye medicines) and neonatal conjunctivitis/ophthalmia neonatorum are more important in poorer developing countries. In affluent regions, lesions of the central nervous system (often associated with prematurity) predominate, whereas hereditary diseases are more important in industrialised countries and the Middle East. Perinatal factors, such as retinopathy of prematurity, are important in middle-income regions, i.e. Latin America and the former socialist economies of Eastern Europe. In all regions, the underlying causes could not be determined in a high proportion of children.

The anatomical site most commonly affected is the retina (353,000 children), followed by corneal scarring (265,000), and lesions of the whole globe (258,900). Hereditary factors (381,300) are the commonest underlying causes, followed by acquired conditions of childhood (241,200).

Changes in the causes of blindness over time

Economic development and specific interventions are changing the pattern of blindness in children all over the world, including India.[7] For example, more extensive programmes of measles immunisation and better control of vitamin A deficiency disorders are reducing corneal blindness in many low-income countries; cataract is becoming more important. In middle-income countries, neonatal intensive care services are expanding; retinopathy of prematurity is now a major potentially avoidable cause of childhood blindness in many countries in Latin America, Eastern Europe, and cities in Asia.[8]

Table 3. Magnitude and causes of blindness in children per 10 million total population in different regions

	Affluent	Middle-income	Poor	Very poor
% children in population	20%	30%	40%	50%
No. of children/10 million total population	2 million	3 million	4 million	5 million
Prevalence of blindness	0.3/1,000	0.6/1,000	0.9/1,000	1.2/1,000
Blind children/10 million total population	600	1,800	3,600	6,000
No. of children blind by:				
Corneal scar	0	0	720	2,000
Cataract or glaucoma	60	360	720	1,000
Retinopathy of prematurity	60	450	0	0
Others (mainly unavoidable)	480	990	2,160	3,000

Planning for the control of blindness in children

VISION 2020 advocates planning for the control of blindness in children for a total population of 10 million.[4] Table 3 illustrates how the magnitude and causes of blindness vary by level of economic development; different regions will, therefore, have different priorities for control. Preventable causes can be reduced at the primary level of service delivery, whereas treatable causes require specialised paediatric ophthalmology units, systems for early identification, referral and follow-up, and increased public awareness. Holistic, comprehensive, multisectoral approaches are needed, including provision for children with low vision.

Ideally, data on the causes of blindness should be obtained by examining children in the community, not in schools for the blind; the key informant method (discussed on page 30) has been proven to be highly effective.[9]

References

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