

Magnitude of Glaucoma Blindness in Developing Countries

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Overview

The exact number of blind in the world is not accurately known, but it has been estimated many times by WHO. In 1972 a WHO Study group on Prevention of Blindness proposed a uniform definition of blindness & visual impairment which have been included in ICD - 10 (International classification of diseases related health problems, tenth revision). The WHO-programme for prevention of blindness created a blindness data bank in 1978 for collection & dissemination of epidemiological information. Also in 1993, work was undertaken, in collaboration with world bank, to measure the global burden of blindness. Globally, now it is estimated that there are about 38 million blind in the world in addition to about 110 million who have low vision & are at great risk of becoming blind. Although glaucoma is third major cause of blindness (after cataract & trachoma) all over the world, still very limited information is available on the exact magnitude of the problem. Overall, it is estimated that glaucoma is responsible for about 5.2 million blind in the world (which is 15% of total burden of world blindness).

Blindness: Best corrected visual acuity of less than 3/60 (0.05) or corresponding visual field loss in the better eye (visual impairment categories 3,4 & 5 in ICD - 10). This corresponds to loss of walk about vision.

Glaucoma: Denotes a group of diseases with certain common features in particular

- atrophy of optic disc
- characteristic visual field loss.

Increased intraocular pressure is only a risk factor. Of these, visual field loss is most specific but is a late manifestation and is not suitable for large

scale early detection, especially in developing countries. Cupping of disc & intraocular pressure show physiological variation in a given population.

Low vision: is best corrected visual acuity of less than 6/18 (0.3) but equal to or more than 3/60 (0.05) in the better eye (visual impairment categories 1 & 2 in ICD-10).

Country groups

For operational and analytical purposes the world bank's main criteria for classifying economies is GNP (gross national product) per capita. According to World Development Report, 1993-

- a. Low- income economies: are those with GNP per capita of \$635 or less in 1991. (eg. India, China)
- b. Middle income-economies: are those with GNP per capita of more than \$655 but less than \$ 7911 in 1991 (eg. Saudi Arabia, Russia)
- c. High- income economies: are those with GNP per capita of more than \$ 7911 in 1991. (eg, USA; Australia).

Low & middle income economies are sometimes referred to as developing countries. But classification by income does not necessarily reflect development status.

For purpose of demographic & epidemiological analysis, world development report 1993, groups economies into eight regions as follows.

- a. Sub-Saharan Africa - includes all countries south of Sahara including Madagascar & south Africa, but excluding Mauritius, Reunion & Seychelles which are in other Asia & islands groups.
- b. India
- c. China

- d. Other Asia & Islands - includes the low & middle income economies of Asia (excluding India & China) & the island of Indian & Pacific oceans except Madagascar.
- e. Latin America & the Caribbean countries - all economies south of US.
- f. Middle eastern crescent economies extending across north Africa, through middle east to Asian republics of former Soviet Union.
- g. Formerly socialist economies of Europe (FSE) includes, European republics of former Soviet Union & the formerly socialist economies of eastern & central Europe.
- h. Established market economies (EME) - includes all countries of the Organisation for Economic Co-operation & Development (OECD) except Turkey as well as a number of small high-income economies in Europe.

These eight regions fall into two broad demographic groups. The first consists of FSE & EME, where relatively uniform age distributions are leading to older populations. The other six regions are referred to as demographically developing in the sense that their age distributions are younger but ageing.

Available data on glaucoma blindness

Most of the data available on blindness worldwide is based on population based surveys using $< 3/60$ as criteria for blindness. But data from some countries is based on census (Greenland - also uses registration), registration (eg Italy) or estimates (eg. Yemen, Zimbabwe) and/or uses definition of blindness other than $< 3/60$ (eg. Sudan $< 6/60$, Bolivia $< 6/60$, Bangladesh $< 1/60$).

Over all, it is estimated that glaucoma is responsible for 5.2 million blind (out of 38 million blind in the world) - i.e. about 15% of total burden of world blindness. The proportion of blindness due to glaucoma ranges from about 2% to 34% in different regions of the world. A survey conducted in Mongolia between 1991 and 1992 showed that glaucoma is responsible for 34.8% of blindness in Mongolia and about 2500 patients over 40 years old need glaucoma surgery. Glaucoma is respon-

sible for 2% of blindness in Gambia, 3.2% in Nepal, 9% in Congo, 12% in Turkey and Ethiopia, 14.3% in Morocco, 15% in Benin, 22% in Niger and in some regions of China, 27% in Malta and 34.8% in Mongolia. It is estimated that about 60% of total global burden of glaucoma is accounted for by POAG in people older than 40 yr. (about 13.5 million cases). About 26.6% of total global burden of glaucoma is accounted for by PACG in people older than 40 yr. (6 million cases) About 12.1% of glaucoma cases have secondary glaucoma. Congenital glaucoma represent 1.3% of glaucoma cases worldwide. In addition there are about 105 million glaucoma suspects (IOP > 21 mmHg) Distribution of POAG in different regions of world is as follows (Table 1):

Region	% of global total of POAG
India	12.9
Established market economies	17.6
Former socialist economies	7.2
China	20.1
Other Asia and islands	10.8
Sub-Saharan Africa	19.4
Latin America and Caribbean	6.7
Middle east crescent	5.2

Distribution of PACG in different regions of world is as follows (Table 2):

Region	% of global total of PACG
India	12.7
Established market economies	5.6
Former socialist economies	2.3
China	37.1
Other Asia and Islands	26.4
Sub-Saharan Africa	10.6
Latin America and Caribbean	1.6
Middle east crescent	1.3

Out of global total of 5.2 million blind because of glaucoma, POAG accounts for 3 million cases, PACG

accounts for 2 million cases & congenital glaucoma is responsible for 0.2 million cases.

Glaucoma problem in India

A very limited data is available on the exact magnitude of glaucoma problem in India. In a survey conducted in Jaipur in 1985-1986 glaucoma was found to be responsible for about 18% of blindness (Chronic simple glaucoma 9.94% and absolute glaucoma 2.68). In another cross-sectional survey conducted in central India (Wardha, Maharashtra) in those aged above 50 years, glaucoma was found to be responsible for about 8% of blindness and about 7% of visual impairment. Another survey conducted in 1984-89 (WHO - NPCB) in different regions of India showed glaucoma to be responsible for about 2% (whole country) of all cases of blindness. (1% in Tamil Nadu and Uttar Pradesh,

2% in Assam, Bihar, Delhi, Gujarat and Himachal Pradesh, 3% in Andhra Pradesh and Karnataka, 4% in Haryana, Madhya Pradesh and Maharashtra).

Indicators to measure burden of glaucoma blindness

1. Regional burden of glaucoma blindness (RBB-glaucoma)

This is the ratio of percentage of glaucoma blindness of the world, to the percentage of world population for a given geographic region. It helps to compare glaucoma blindness burden in different regions of world by standardising the data. It tells us the proportionate "share" of glaucoma blindness of a region in relation to its share of population. Regionwise distribution of glaucoma blindness and RBB for glaucoma, trachoma and cataract is shown as follows: Table 3.

Region (% of global population)	(% of Glaucoma blindness of world)	RBB Glaucoma	RBB Cataract	RBB Trachoma
India (16.1%)	22.3	1.38	2.0	0.91
Established market economies (15.1%)	3.5	0.23	0.03	
Former socialist economies (6.6%)	1.4	0.21	0.09	
China (21.4%)	29	1.35	0.64	0.93
Other Asia & Islands (13%)	19	1.46	1.12	1.78
Sub-Saharan Africa (9.7%)	16.6	1.71	2.02	2.42
Latin America & Caribbean (8.4%)	3.5	0.42	1.03	0.32
Middle eastern crescent (9.6%)	4.6	0.48	1.04	1.64

The RBB for POAG and PACG in different regions of world is shown on Table 4.

	RBB (POAG)	RBB (PACG)
India	0.8	0.79
EME	1.16	0.37
FSE	1.09	0.35
China	0.94	1.73
Other Asia & Islands	0.83	2.03
Sub-Saharan Africa	2.00	0.06
Latin America & Caribbean	0.79	0.19
Middle east	0.54	0.13

2. Disability - adjusted life year (DALY)

It is a unit used to measure both the global burden of disease & the effectiveness of health interventions as indicated by reductions in disease burden. It is calculated as the present value of the future years of disability-free life that are lost as a result of premature deaths or cases of disability occurring in a particular year.

Burden of disease in females & males (1990) for glaucoma (according to world development report 1993) is as follows: Table 5

Hundreds of Thousands of DALY Lost

	Females	Males
India	1.7	2.3
EME	0.4	0.1
FSE	0.1	0.1
China	3.4	1.5
Other Asia & Islands	2.9	1.3
Sub-Saharan Africa	1.7	0.0
Latin America & Caribbean	0.4	0.2
Middle East	0.1	0.3
Total (World)	10.7	5.8

Difficulties in estimating glaucoma blindness

- Lack of uniform definition of glaucoma-The cupping of disc & intraocular pressure exhibit physiological variations in a given population & therefore are not very diagnostic. The low-tension glaucoma may be missed if some cut off level of IOP is taken for glaucoma screening. The visual field loss is more diagnostic but is relatively late manifestation & is not easily available especially in developing countries.
- Associated secondary causes of blindness - In a patient with glaucoma the blindness can also be from causes other than glaucoma e.g. from cataract, macular degeneration, venous thrombosis, severe myopia, diabetic retinopathy, detached retina & iridocyclitis etc. Therefore glaucoma blindness may be underestimation.
- Many patients never come for medical care - especially in developing countries patients neglect symptoms in early stages & they don't travel long distance to see an ophthalmologist.
- Records are not maintained properly & therefore many cases of glaucoma remain undiagnosed. In addition all blind patients are not registered.
- Glaucoma cases are only rarely followed up properly especially in developing countries.

Glaucoma blindness problem in developing countries:

Glaucoma blindness was not given much importance in past but now it is apparent that the problem is greater than previously thought. Glaucoma is third most important global cause of blindness (after cataract & trachoma) Whereas 58.5 % of total World population aged 60 years or more is in demographically developing countries 85.2 % cases of POAG & 92.1 % cases of PACG are in these countries. On the other hand Established Market Economies & Former Socialist Economies of Europe with 41.5 % of total world population aged 60 years or above have only 24.8 % of total cases of POAG & 7.9 % of total cases of PACG.

There is general lack of awareness among most people in developing countries about the nature of their eye problems & about the eye care facilities available to help them, mainly because of poor education level & poor socio-economic conditions. Also there is marked scarcity of specialised eye care services. Europe has one ophthalmologist per 20,000 population whereas India has one ophthalmologist per 1,00,000 population, In addition most of the ophthalmologist are concentrated in urban areas. Rural areas are severely short of ophthalmologists & specialised eye care facilities.

Most of glaucoma patients have limited accessibility to specialised eye care services in developing countries because of long distances they have to travel to see an ophthalmologist & because of inability to afford the high cost of medical care. Therefore they receive low quality care. The government hospitals which provide the greatest proportion of medical care in developing countries are often inequipped, are inefficient, suffer from highly centralised decision - making, wide fluctuations in budgetary allocation, poor motivation of faculty managers & health care workers, declining staff morale & falling quality of care, The private providers- mainly non-governmental organisations (NGOs) & private hospitals & private practitioners provide only small proportion of services which is

of high quality but they are not supported by government policies. The poor often loose in health because public spending in the sector is heavily skewed towards high-cost hospital services that disproportionately benefit better-off urban groups. According to world development report, whereas in 1990, USA spent about 12 % of its GNP on health, developing countries spent only less 4 % of their GNF on health.

Strategies for reducing blindness due to glaucoma in developing countries. The earlier the disease is detected the less is the resultant blindness. Awareness about glaucoma & irreversible loss of vision in glaucoma should be created in the general public.

All of us as subspecialists see the case, far too late. For every patient we see there may be many more who have gone blind from glaucoma. Since routine eyecheck for the vulnerable groups are not a part of health care programme for the great majority of rural population, it may be desirable to close in on such groups. The vulnerable groups are

- i. over 40 year old,
- ii. presbyopes
- iii. immature cataracts
- iv. cases with family history of glaucoma
- v. diabetics
- vi. individuals on steroids.

In addition, better evaluation of the optic discs & fields & simple tests (eye flash light test) to detect shallow anterior chambers should be emphasized. We need to set realistic goals to be able to achieve them.

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