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## IAPB Briefing Paper

# The Global Burden of Disease (GBD) 2010 Study



International Agency for the Prevention of Blindness



The purpose of IAPB Briefing Papers is to inform IAPB members and others about important and emerging issues affecting the elimination of avoidable blindness and the development of eye health systems.

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### Key points

Vision loss (as used in the GBD 2010 study) – visual impairment and blindness – remains a significant cause of disability globally.

- 4 out of 5 people with vision loss are needlessly impaired – in other words, 80% of vision loss is preventable or treatable.
- The prevalence of vision loss increases with age. Despite the fact that there is an increasing number of older people in almost every country in the world, recent efforts against blindness and vision loss have reduced the prevalence of blindness and visual impairment dramatically.
- However, the absolute number of people with blindness has remained stable and the number of people with visual impairment has increased due to population growth. This shows what can be achieved and points to future opportunities for even greater impact.

Tracking the numbers of people affected by blindness and vision loss is important for a range of reasons, including:

- For national budgeting and health service planning (including for training the eye health work force);
- To measure the impact of eye health services; to calculate the burden of disease and its economic impact; and
- For evidence-based advocacy to promote action against blindness and vision loss.

There are two recent studies estimating the prevalence of blindness and vision loss<sup>i, ii</sup>. One was published by the World Health Organization Prevention of Blindness and Deafness Programme (WHO PBD) and the other by an expert group as part of the Global Burden of Diseases, Injuries and Risk Factors Study (GBD)<sup>iii</sup>.



- Both studies update the previous estimates by the World Health Organization (WHO) released in 1995, 2002, and 2004. These estimates provide point prevalence estimates globally and for each of the WHO regions. They also estimate the major causes of vision loss.
- The two studies differ in their analytic approaches, however.
- Therefore, the studies give different results for the estimates of global blindness and visual impairment.

The studies should be viewed as complementary, each playing a different role. The intended use for the numbers should determine which set of data is selected.

- The WHO PBD data benefits from being the “official” estimates. For example, one might select this data for advocacy purposes.
- The GBD data benefits from a sophisticated methodology that gives greater precision on a country-by-country basis and disaggregated by age groupings and by blindness versus visual impairment. It draws on a bigger and more up-to-date body of data. Importantly, it also allows for comparison over time. For example, one might select this data for eye health service planning.

The key findings of both studies are presented in table 1 below. A detailed comparison of the methodologies used is presented in the annex.

It is worth noting that both studies cite the need for better data, particularly a greater number of regular, nationally-representative surveys that use standardized methodologies as defined by the WHO and that report results disaggregated by age and gender. There is also a need for studies to include near vision, which is so important for people’s daily lives at home and at work.

**Table 1: Top-line numbers**

	<b>WHO PBD</b>	<b>GBD</b>
<b>Global prevalence blindness and visual impairment</b>	<ul style="list-style-type: none"> <li>• Total: 285 million</li> <li>• Blind: 39 million</li> <li>• Low Vision: 246 million</li> </ul>	<ul style="list-style-type: none"> <li>• Total: 223.4million</li> <li>• Blind: 32.4 million</li> <li>• Moderate and severe visual impairment (MSVI): 191 million</li> <li>• 95% uncertainty intervals: 29.4 – 36.5 million blind, 174 - 230 million visually impaired</li> </ul>
<b>Burden by gender</b>		Women represent 60.0% of blindness and 57% of MSVI
<b>Burden by age</b>	≥50 years represent 82% of blindness and 65% of VI	≥50 years represent 84.6% of blindness and 77.5% of MSVI
<b>Other key findings</b>	The principal causes of blindness are: <ul style="list-style-type: none"> <li>• Cataracts (51%)</li> <li>• Glaucoma (8%)</li> <li>• Age related macular degeneration (5%)</li> <li>• Childhood blindness and corneal opacities (4%)</li> </ul>	A dramatic decrease (approximately 18 million cases of averted blindness) in the global age-standardized prevalence of blindness and MSVI for adults aged 50+ years: <ul style="list-style-type: none"> <li>• 1990: 3.0% (2.7%-3.4%)</li> </ul>

	<ul style="list-style-type: none"> <li>• Uncorrected refractive errors and trachoma (3%)</li> <li>• Diabetic retinopathy (1%)</li> <li>• Undetermined (21%)</li> </ul> <p>The principal causes of visual impairment are:</p> <ul style="list-style-type: none"> <li>• Uncorrected refractive errors (43%)</li> <li>• Cataracts (33%)</li> <li>• Glaucoma (2%)</li> <li>• Age related macular degeneration, diabetic retinopathy, trachoma, and corneal opacities (each about 1%)</li> <li>• Undetermined (18%)</li> </ul>	<p>blind and 14.3% VI (12.1%-16.2%)</p> <ul style="list-style-type: none"> <li>• 2010: 1.9% (1.7%-2.2%) blind and 10.4% VI (9.5%-12.3%)</li> </ul> <p>More than half of the world's visually impaired people live in just 5 populous countries: China, India, Indonesia, Nigeria and Pakistan.</p>
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## Annex: Detailed analysis of methodologies

	WHO PBD	GBD
<b>Author group</b>	World Health Organization Prevention of Blindness and Deafness Programme (WHO PBD)	Global Burden of Disease Vision Loss Expert Group, over 60 experts from around the world (listed in footnote 3)
<b>Definitions (presenting visual acuity)</b>	<ul style="list-style-type: none"> <li>• Blindness = <math>&lt;3/60</math></li> <li>• Visual Impairment (VI) = <math>&lt;6/18</math> to <math>\geq 3/60</math></li> </ul>	<ul style="list-style-type: none"> <li>• Blindness = <math>&lt;3/60</math></li> <li>• VI = <math>&lt;6/18</math> but <math>\geq 3/60</math></li> </ul>
<b>Data sources</b>	<ul style="list-style-type: none"> <li>• Visual data: 53 surveys from 39 countries               <ul style="list-style-type: none"> <li>• 38 from 2005-08, 15 from 2001-04</li> <li>• Most studies are rapid assessments of <math>\geq 50</math> year age group, usually for cataract service planning</li> <li>• Note limited or absent data for high income countries across regions and for certain regions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Visual data: 227 studies used from 84 countries               <ul style="list-style-type: none"> <li>• 243 published and unpublished studies reviewed</li> <li>• Systematic review from 1980 to January 2012</li> </ul> </li> </ul>
<b>Granularity of results</b>	<ul style="list-style-type: none"> <li>• Age: 0-14, 15-49, <math>\geq 50</math> years</li> <li>• Gender: grouped</li> <li>• Time: point estimate for 2010, not comparable to previous methodologies for trend comparisons</li> <li>• Geography: 6 WHO regions</li> </ul>	<ul style="list-style-type: none"> <li>• Age: by 5 year intervals</li> <li>• Gender: disaggregated</li> <li>• Time: series over 20 year to enable trend analysis for both backward and forward estimates</li> <li>• Geography: 190 country, 21 GBD subgroups</li> </ul>
<b>Modeling methodology</b>	<ul style="list-style-type: none"> <li>• “Simple imputation”, not regression analysis</li> <li>• Derived rates of VI from blindness data, estimated causes from past papers (1995, 2002)</li> </ul>	<ul style="list-style-type: none"> <li>• Complex regression analysis based on multiple hierarchical models with scenario modeling to compensate for missing data</li> <li>• Modeled blindness and VI separately, accounting for variation in VI over time</li> </ul>
<b>Modeling inputs</b>	<ul style="list-style-type: none"> <li>• Imputed weighted averages for regions based on existing country studies, modified by:               <ul style="list-style-type: none"> <li>• 2007 GDP per capita by PPP</li> <li>• World Bank economic stratification by income level to cluster countries</li> <li>• Prevalence of blindness in <math>\geq 50</math> year age group to</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Separately modeled blindness and VI by country based on existing country studies, modified by:               <ul style="list-style-type: none"> <li>• GDP per capita</li> <li>• Adult education levels</li> <li>• Access to health care</li> </ul> </li> </ul>



	derive VI	
<b>Estimated accuracy</b>	+/- 20% for <50 year olds, +/- 10% for ≥50 year olds for blindness only (as VI estimates are correlates)	95% confidence limits given for all estimates

## References

<sup>i</sup> Mariotti S. Global Data on Visual Impairments: 2010. World Health Organization 2012. Available at: <http://www.who.int/entity/blindness/GLOBALDATAFINALforweb.pdf>

<sup>ii</sup> Stevens GA, White RA, Flaxman SR, Price H, Jonas JB, Keeffe J, Leasher J, Naidoo K, Pesudovs K, Resnikoff S, Taylor H, Bourne RR; Vision Loss Expert Group. Ophthalmology. 2013 Jul 10. doi:pil: S0161-6420(13)00480-6. 10.1016/j.ophtha.2013.05.025. [Epub ahead of print]

<sup>iii</sup> A list of the GBD Vision Loss Expert Group members is available at: [http://www.anglia.ac.uk/ruskin/en/home/microsites/veru/other\\_research\\_areas/global\\_burden\\_of\\_diseases.html](http://www.anglia.ac.uk/ruskin/en/home/microsites/veru/other_research_areas/global_burden_of_diseases.html).

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