

# The Global Economic Cost of Visual Impairment: Summary Report

April 2010

## Background

In 2009, AMD Alliance International commissioned Access Economics Pty Limited, a world-leading independent economic consulting firm, to conduct a comprehensive study on the worldwide economic and health burdens of visual impairment. Specialists in model-based health forecasting and analysis, Access Economics has previously estimated the burden of vision loss for Australia, Canada, Japan, the United Kingdom, and the United States. This is the first study to report the burden of visual impairment for all world regions.

Using regional prevalence data, the numbers of people in each World Health Organisation (WHO) subregion having visual impairment are projected for the years 2010 to 2020, and include:

- People with mild visual impairment ( $6/18 < \text{visual acuity} \leq 6/12$ )
- People with moderate visual impairment ( $6/60 < \text{visual acuity} \leq 6/18$ )
- People who are blind (visual acuity  $< 6/60$ ).

The analysis accounts for regional demographic trends and the distribution of visual impairment by eye condition, including age-related macular degeneration (AMD), diabetic retinopathy, cataract, uncorrected refractive error and other causes. The study includes actual cost data where available and draws on previous research into national expenditures on visual impairment. Findings are extrapolated to all regions using relative health care prices and key health and economic indicators.

The findings of this report are the most comprehensive data now available on the global burden of visual impairment. The breadth of results covers the direct health care system costs, the value of lost productivity (due to disability and premature death) and informal caregiver time, and the deadweight welfare losses in raising tax revenue to fund health care. All costs are reported in 2008 US dollars. Global and regional disability-adjusted life year (DALY) burdens are also reported.

This document provides a summary of the full report, *The Global Economic Cost of Visual Impairment*, which will be released in 2010.

## About AMD Alliance International:

AMD Alliance International strives to bring knowledge, help and hope to individuals and families around the world affected by AMD. Their mission is to bring knowledge, hope, and help to individuals and families around the world affected by AMD, and is accomplished through:

- Generating awareness and understanding of AMD;
- Promoting the importance of education, early detection, knowledge of treatment and rehabilitation;

- Preserving vision and improving the quality of life of individuals affected by AMD.

To find out more, visit [www.amdalliance.org](http://www.amdalliance.org)

## The Global Cost of Visual Impairment

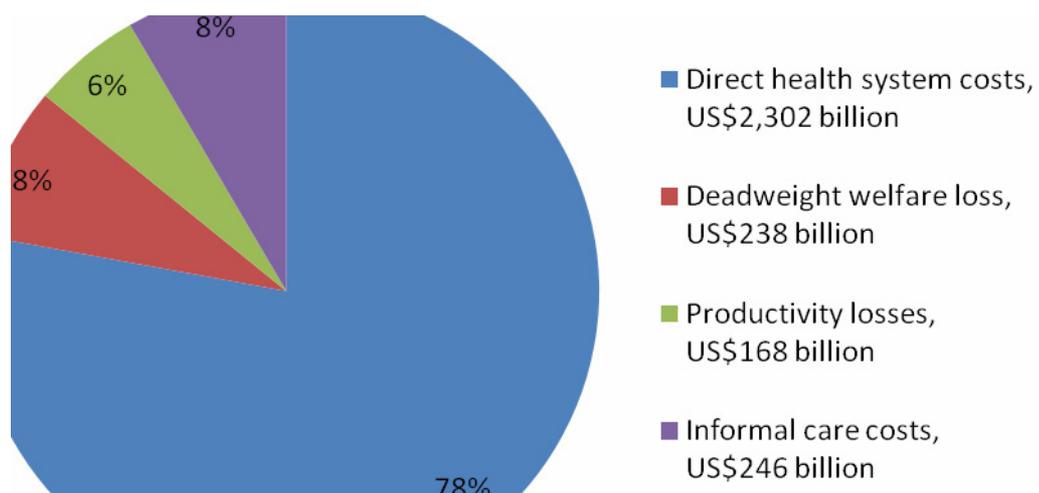
**The real financial cost of visual impairment worldwide is estimated to be US\$2,954 billion in 2010.**

- This is equal to an average cost of US\$434 for every individual with or without visual impairment, or US\$4,030 for every person with visual impairment.
- The total and per person costs vary substantially between regions according to population size, prevalence, and a range of health and economic factors.
- The real financial cost is comprised of two components: direct (health-related) costs of vision loss estimated at US\$2,302 billion, and indirect costs (production losses, informal care and deadweight welfare losses) estimated at US\$652 billion.

**The cost of visual impairment due to AMD accounts for US\$343 billion or 12% of the total global cost of visual impairment.**

- This proportion varies around the world and is up to 30% in developed regions.

**Figure 1: Global Financial Costs of Visual Impairment in 2010**



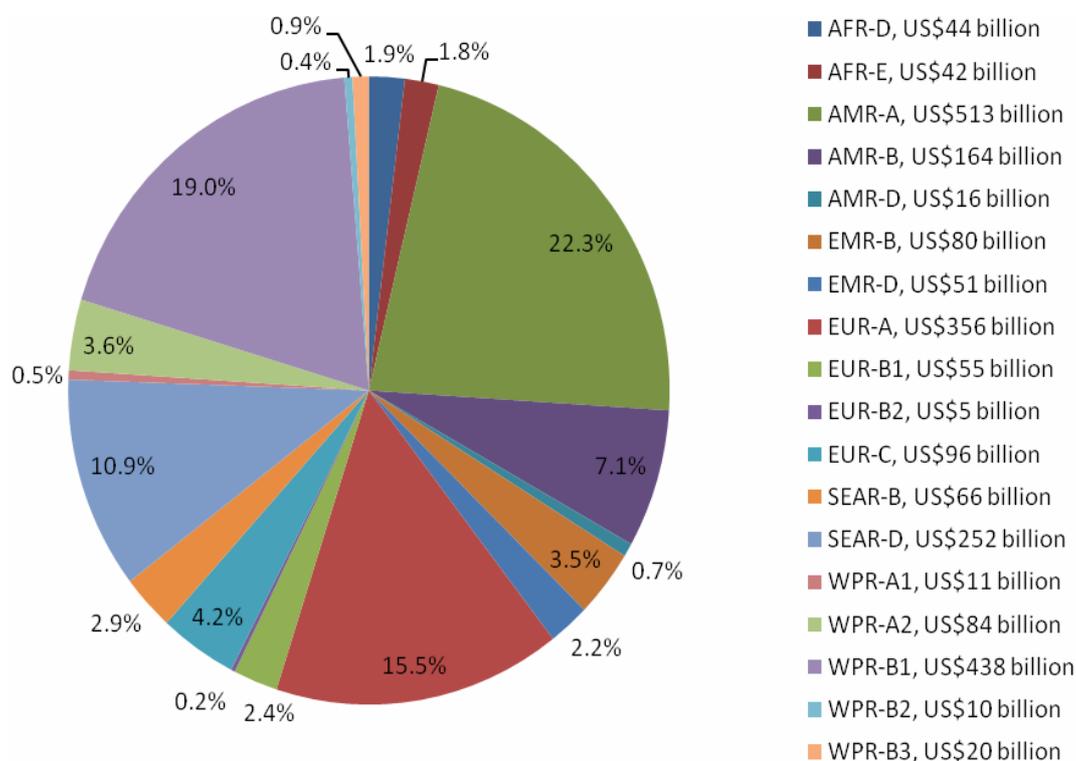
## Direct Health System Costs

**The direct costs of visual impairment are exceptionally large, totalling US\$2,302 billion worldwide in 2010.**

- Direct health system costs include pharmaceuticals, optometry, residential care, eye care research, community health, visual aids, and hospital expenditure.
- The average direct cost per person with visual impairment is estimated to range from US\$963 in African region E to US\$23,421 in Americas region A.
- The total direct health system cost of visual impairment is estimated to range from US\$4.6 billion in European region B2 to US\$512.8 billion in Americas region A.

**The estimated global direct cost of visual impairment due to AMD totals US\$255 billion or 11% of all direct costs in 2010.**

**Figure 2: Regional Direct Costs of Visual Impairment in 2010**



## **Indirect costs**

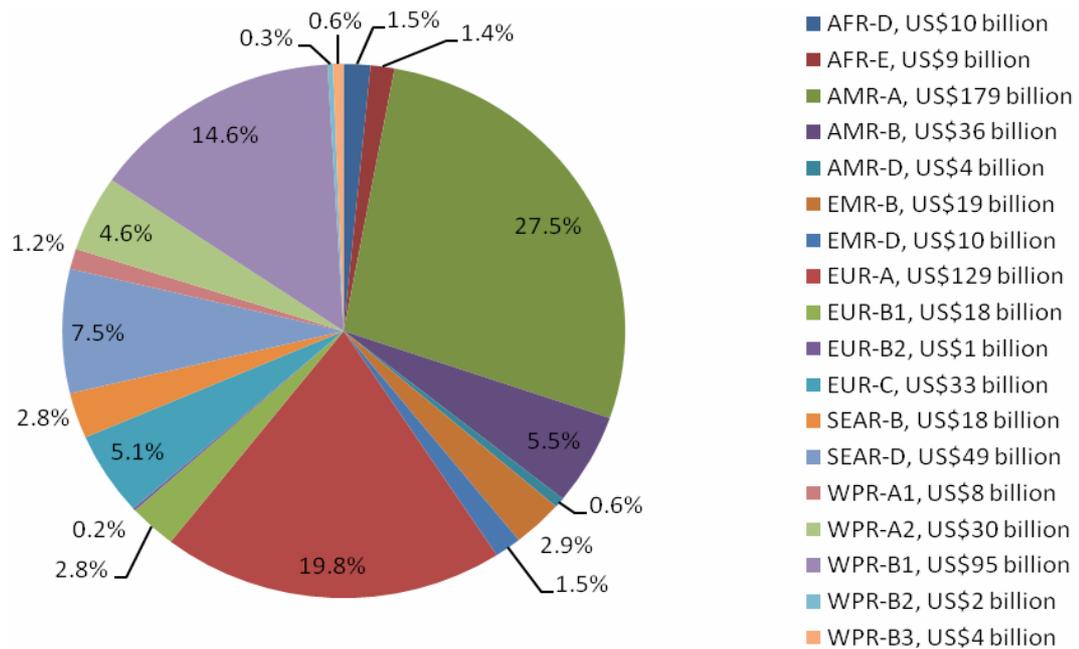
**Just as important as the direct costs of vision loss are the indirect costs, which are estimated to add US\$652 billion to the overall cost of visual impairment in 2010, or 22% of total costs.**

- Informal care constitutes 38% of all indirect costs – the value of lost working or leisure time for family and friends who act as caregivers for people with moderate visual impairment or blindness is valued at US\$246 billion worldwide in 2010.
- Lost productivity for people with moderate visual impairment, blindness, or premature death due to visual impairment is estimated to cost the global economy nearly US\$168 billion in 2010 or 37% of all indirect costs. Given a lack of data for developing countries this global estimate only includes developed regions and is therefore conservative.
- Deadweight welfare losses refer to the inefficiencies in raising tax revenues to fund government expenditure on health care for people with visual impairment. These losses constitute 26% of all indirect costs.

**The estimated indirect costs of visual impairment due to AMD total US\$88 billion in 2010.**

- These comprise US\$23 billion informal care costs, US\$34 billion productivity losses, and US\$31 billion deadweight welfare losses.

**Figure 3: Regional Indirect Costs of Visual Impairment in 2010**



## Burden of disease

**Visual impairment imposes a substantial amount of suffering, and prevents healthy, independent living and ageing.**

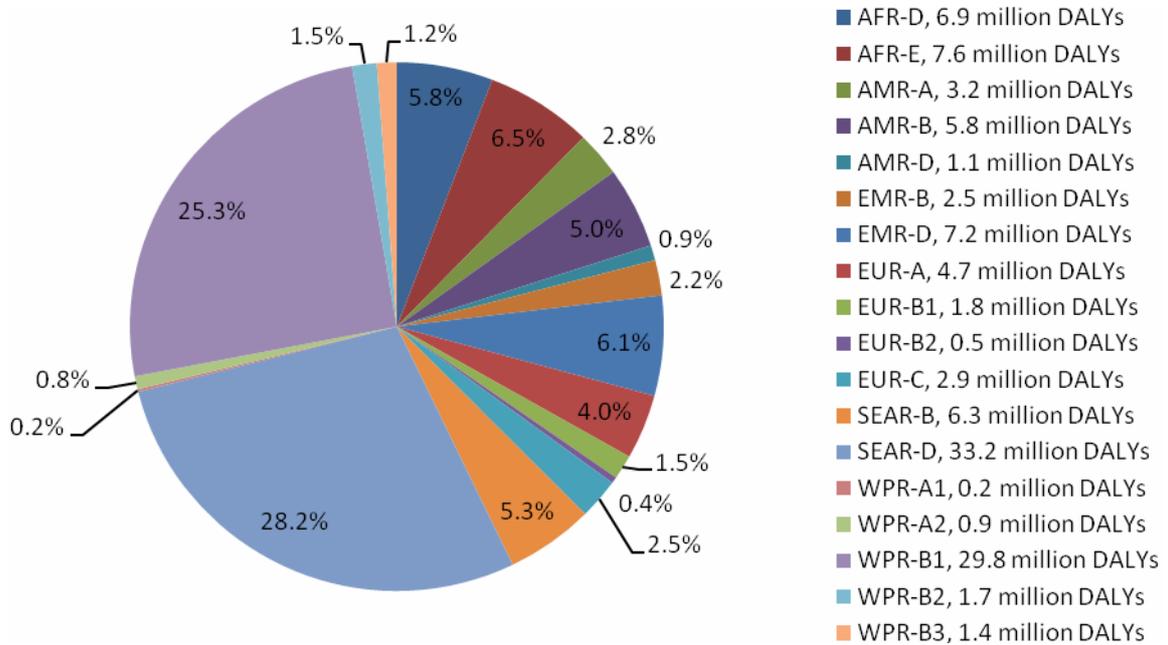
- Compared to people who are sighted, people with vision loss experience:
  - A reduced quality of life
  - Greater difficulty with daily living and social dependence
  - Higher rates of clinical depression
  - Twice the risk of premature death
  - An increased risk of falls and related hip fractures
  - Premature admission to nursing homes
- The WHO developed the disability adjusted life year (DALY) as a measure of overall disease burden, where one DALY represents the loss of the equivalent of one full year of health. The DALY measure accounts for both disability and premature death associated with a disease.

**Worldwide, people with visual impairment were deprived of the equivalent of 118 million years of healthy life due to disability and premature death in 2010.**

- This burden includes 8 million DALYs due to mild visual impairment, 43 million DALYs due to moderate visual impairment, and 68 million DALYs due to blindness

- AMD was the cause of an estimated 6 million DALYs.

**Figure 4: Regional DALY Burdens Due To Visual Impairment in 2010**



## **Causes of vision loss**

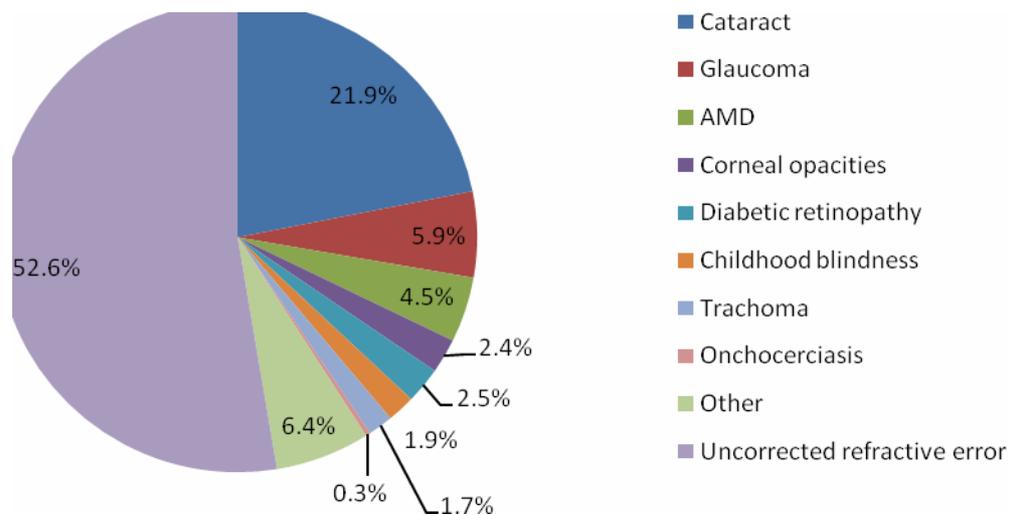
**Most of the visual impairment worldwide is caused by five eye conditions.**

- Age-related macular degeneration (AMD)
- Cataract
- Diabetic retinopathy
- Glaucoma
- Uncorrected refractive error (URE)

**There is considerable variability between world regions in the distribution of visual impairment by cause.**

- URE accounts for 53% of visual impairment worldwide - the prevalence of visual impairment is substantially underestimated when only defined using best-corrected visual acuity (the best possible vision that can be achieved using glasses or contact lenses).
- Cataracts are responsible for over one-third of visual impairment in some developing regions, but only 2-3% in the 'A regions' of the Americas, Europe, and the Western Pacific.
- AMD is the cause of 19-30% of visual impairment in the most developed regions, reflecting older populations and greater life expectancy in those countries. Worldwide, AMD is the cause of 4% of visual impairment.
- Diabetic retinopathy is the cause of 6-10% of visual impairment in developed regions, reflecting the greater prevalence of diabetes in those areas.

**Figure 5: Distribution of Global Visual Impairment by Cause in 2010**



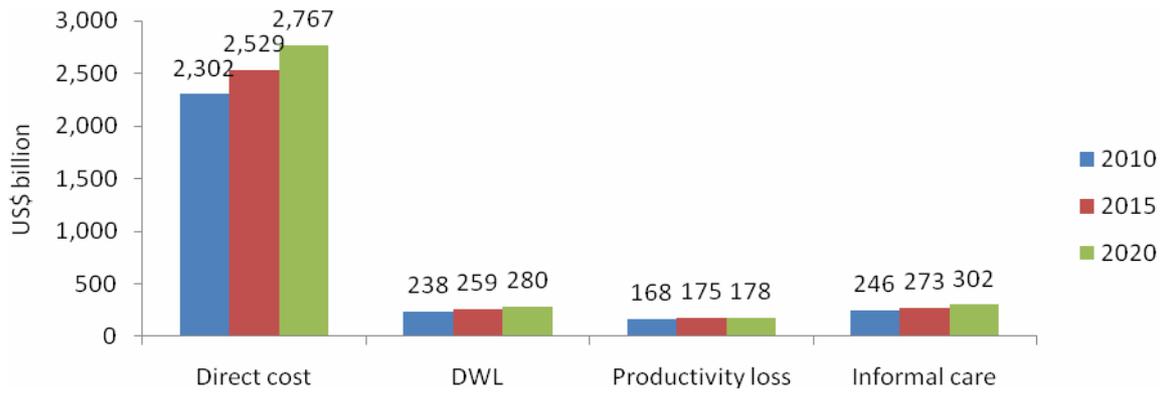
This distribution reflects 2002 data (Resnikoff et al 2004; 2008) and varies slightly each year with changing regional population age structures

## The future of vision loss

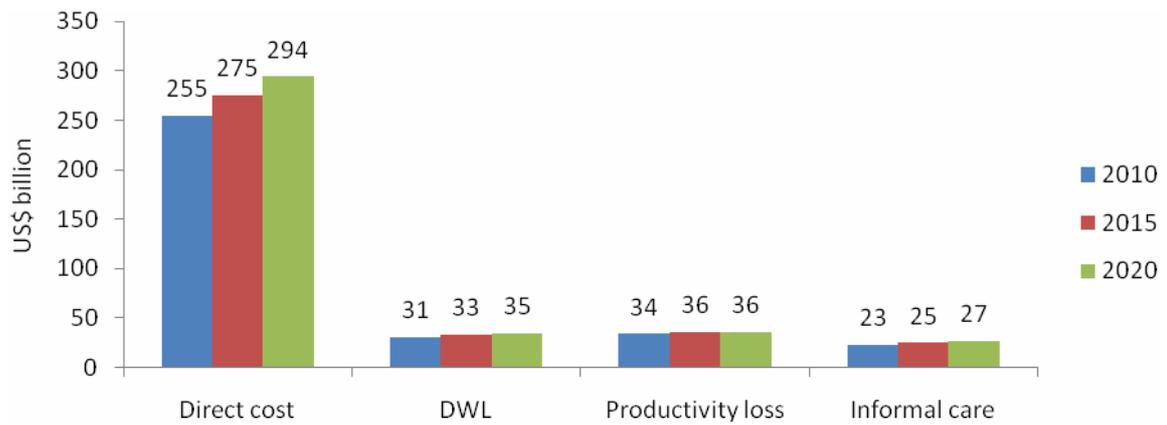
**Unless action is taken, the costs of vision loss will continue to rise in the future, placing large demands on international health care systems and taking ever greater tolls on the health and welfare of the world population.**

- There are expected to be 929 million people with visual impairment by 2020 – a projected increase of 27% from 733 million people in 2010. This number will continue to escalate alongside world population growth.
- Under these projections, the financial cost of vision loss will be \$3,527 billion by 2020 (at current prices), of which \$2,767 billion is made up of direct health care expenditures.
- The spiralling cost of visual impairment is a major problem in developed regions, which have the highest health care costs, diabetes prevalence, and older populations.

**Figure 6: Projected Increases in the Costs of Visual Impairment, 2010-2020**



**Figure 7: Projected Increases in the Costs of Visual Impairment due to AMD, 2010-2020**



## What can we do?

**Most visual impairment can be avoided or treated with well known and inexpensive methods. These would reduce the enormous personal, social and economic burdens of vision loss on societies worldwide.**

- With more research funding allocated to vision health, we could become much closer to preventing and curing eye disease.
- By elevating vision health as a public health issue, people could become better informed about vision loss and take significant steps to reduce their risk.

**Globally, there is still much preventable blindness to eradicate. By investing in the right strategies, the increasing trends of vision loss could be reversed.**

### **Five Strategies to Reduce the Global Burden of Visual Impairment**

1. Coordinate greater screening of high-risk groups including people with diabetes and the elderly; the prevalence of visual impairment due to longevity (AMD) and non-communicable chronic diseases is increasing, particularly in developed regions.
2. Provide more training in cataract surgery for doctors working in developing regions; access to cataract surgery is a major barrier to managing sight loss in the developing world.
3. Make corrective eye wear more available and more affordable - over half of all sight loss is caused by uncorrected refractive error, which could easily be reversed using spectacles or contact lenses.

4. Fund and distribute medications to treat river blindness (onchocerciasis) and trachoma

## Appendix A: Regional costs and disease burdens of visual impairment

Extensive results projected to the year 2020 are detailed in the full study report.

**Table A-1: The Global and Regional Burdens of Visual Impairment in 2010**

| WHO subregion | Prevalence (000s) | Direct cost (US\$ billion) | Deadweight welfare loss (US\$ billion) | Informal care (US\$ billion) | Productivity loss (US\$ billion) | DALYs (000s) |
|---------------|-------------------|----------------------------|--|------------------------------|----------------------------------|--------------|
| AFR-D         | 39,308            | 43.8                       | 3.9                                    | 5.8                          | -                                | 6,852        |
| AFR-E         | 43,878            | 42.3                       | 3.8                                    | 5.3                          | -                                | 7,633        |
| AMR-A         | 21,895            | 512.8                      | 50.8                                   | 30.9                         | 97.1                             | 3,242        |
| AMR-B         | 37,675            | 164.4                      | 16.4                                   | 19.5                         | -                                | 5,846        |
| AMR-D         | 6,722             | 15.6                       | 1.6                                    | 2.0                          | -                                | 1,087        |
| EMR-B         | 14,828            | 80.4                       | 8.8                                    | 9.9                          | -                                | 2,537        |
| EMR-D         | 41,599            | 51.4                       | 3.1                                    | 6.4                          | -                                | 7,200        |
| EUR-A         | 31,331            | 355.9                      | 55.3                                   | 33.6                         | 40.3                             | 4,656        |
| EUR-B1        | 11,117            | 54.6                       | 7.5                                    | 4.9                          | 5.7                              | 1,755        |
| EUR-B2        | 2,925             | 4.6                        | 0.4                                    | 0.4                          | 0.6                              | 457          |
| EUR-C         | 18,461            | 95.7                       | 11.9                                   | 9.1                          | 11.9                             | 2,908        |
| SEAR-B        | 35,307            | 66.3                       | 7.1                                    | 10.4                         | -                                | 6,258        |
| SEAR-D        | 208,538           | 251.5                      | 13.5                                   | 35.1                         | -                                | 33,176       |
| WPR-A1        | 1,147             | 11.0                       | 1.4                                    | 2.0                          | 4.2                              | 182          |
| WPR-A2        | 5,865             | 84.1                       | 13.7                                   | 7.6                          | 8.4                              | 934          |
| WPR-B1        | 193,424           | 437.5                      | 36.2                                   | 59.2                         | -                                | 29,812       |
| WPR-B2        | 9,976             | 9.9                        | 0.6                                    | 1.4                          | -                                | 1,748        |
| WPR-B3        | 8,828             | 20.2                       | 1.5                                    | 2.8                          | -                                | 1,415        |
| World         | 732,824           | 2,302.2                    | 237.7                                  | 246.3                        | 168.3                            | 117,699      |

Prevalence numbers were estimated by applying the prevalence of visual acuity (VA) less than 6/12 to United Nations population forecasts. Regional prevalence rates (Resnikoff et al 2004; 2008) were adjusted for differences in visual acuity definitions using studies that report the prevalence of both WHO and other definitions of visual impairment.

Direct costs were estimated assuming a constant ratio between the direct cost per person with visual impairment and GDP per capita, following Wimo et al (2006). This ratio (0.372) was estimated using health care costs in Australia, Canada, Japan, UK, and US (Access Economics 2004; 2006; 2008a; 2008b, Taylor et al 2006) and GDP reported by the IMF.

Deadweight welfare losses assume an efficiency loss of \$0.20 for every \$1 raised by government taxation, estimated from the literature, and are adjusted by 'general government expenditure on health as a percentage of all health expenditure' as reported by the WHO.

Informal care costs were imputed using Australia and UK informal care hours per person, adjusted by the relative availability of formal care services in each region (proxied by the WHO indicator 'community and traditional health workers density per 1000 population'). For each region, the relative value of one informal care hour was estimated using relative GDP per capita (as a proxy for relative wages).

Productivity losses due to disability or premature mortality were calculated for developed regions using the human capital method (it is assumed that these regions operate at sufficiently low unemployment to incur a permanent productivity loss). The inputs include employment rates for persons with or without visual impairment, mean GDP per capita, and estimated years to retirement. Productivity losses due to premature mortality assume a 2.15 relative mortality risk and 0.73% etiological fraction (proportion of additional deaths specifically due to visual impairment).

DALYs are the sum of years of healthy life lost due to disability (YLD) and years of life lost due to premature death (YLL). The YLD calculation uses disability weights of 0.02 for mild visual impairment, 0.17 for moderate visual impairment, and 0.43 for blindness (Stouthard et al 1997). Each YLL incurs one DALY.

## Appendix B: Key references consulted for the study

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