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WORLD VIEW

The economic impact and cost of visual impairment in Australia

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Aims: To quantify the total economic costs of vision loss in Australia.

Methods: Prevalence data of visual impairment, unpublished data on indirect costs, and national healthcare cost databases were used.

Results: Vision disorders cost Australia an estimated A\$9.85 billion in 2004. A\$4.8 billion is the loss of wellbeing (years of life lost as a result of disability and premature mortality). Vision disorders rank seventh and account for 2.7% of the national loss of wellbeing. Direct health system costs total A\$1.8 billion. They have increased by A\$1 billion over the last 10 years and will increase a further A\$1–2 billion in the next 10 years. Cataract, the largest direct cost, takes 18% of expenditure. The health system costs place vision disorders seventh, ahead of coronary heart disease, diabetes, depression, and stroke. Indirect costs, A\$3.2 billion, include carers' costs, low vision aids, lost earnings, and other welfare payments and taxes.

Conclusions: Even a developed economy such as Australia's cannot afford avoidable vision loss. Priority needs to be given to prevent preventable vision loss; to treat treatable eye diseases; and to increase research into vision loss that can be neither prevented nor treated.

Measuring the costs of health care is essential if the cost effectiveness of prevention and treatment is to be calculated. Modelling of global cost data has demonstrated the effects of population growth and the current level of care as leading to a dramatic increase in the total direct costs of eye care.¹ The successful implementation of "Vision 2020: the right to sight"² would reduce the prevalence of avoidable visual impairment and could save about A\$7.5 billion in lost productivity per year worldwide.¹ A recent study in Gambia has shown that the rate of return for a national eye care programme was 10%.³ Any decrease in costs is accompanied by the social benefit of fewer people with avoidable visual impairment. However, much more precise and reliable epidemiological information is required to make better estimates of the total national healthcare costs associated with vision loss.

The prevalence of visual impairment in Australia has recently been presented.⁴ In 2004 there were an estimated 480 000 Australians who were visually impaired, including over 50 000 (10.5%) who were legally blind in Australia (presenting visual acuity <6/60). Prevalence rates for visual impairment (here defined as presenting visual acuity <6/12) increase by age from 0.6% in the 40–49 year age group to 40% for people aged over 90. The prevalence of visual impairment is projected to increase with demographic ageing and in a policy neutral environment, from 5.4% today to 6.5%, or nearly 800 000 people, by 2024. Over the same period, blindness may increase by 73% to nearly 90 000 people in the over 40 age group. Five conditions—age related macular degeneration, cataract, diabetic retinopathy, glaucoma, and undercorrected refractive error—cause over 80% of vision impairment and 78% of blindness.⁴ Over 9.7 million Australians report diseases of the eye and adnexa.⁵ Despite having these data on the prevalence and causes of vision loss in Australia, little information is available about the economic impact of vision loss in Australia or for any developed country. This report examines the economic costs of vision loss in Australia.

METHODS

Data on age and sex specific prevalence rates of vision loss by cause, mortality rates, morbidity, service utilisation, and socioeconomic impacts were derived from combined datasets from the Melbourne Visual Impairment Project (VIP) and the Blue Mountains Eye Study (BMES).⁴

These data were applied to AusStats data on the Australian population by age and sex from the 2001 Australian Census.⁶ The calculation of the number of deaths from visual impairment in 2004 is quite novel and complex, the methodology for this calculation is described in detail elsewhere⁷ (www.cera.org.au/clearinsight).

Direct health costs

Direct health system costs were determined using a top down approach based on the methodology developed by the Australian Institute of Health and Welfare (AIHW), in collaboration with the National Centre for Health Program Evaluation (NCHPE) for the Disease Costs and Impact Study (DCIS).^{8–9} DCIS measures health services utilisation and expenditure for specific diseases and disease groups in Australia, in accordance with the Ninth Revision of the International Classification of Disease (ICD-9).¹⁰ These expenditures relate to all eye health costs that may include some conditions which do not cause visual impairment. They include all expenditures for the care of the eye and adnexa for the Australian population as a whole. Costings for the year 2000–1 were used to estimate costs in 2004.⁹ Two factors contributed to the extrapolation: health cost inflation, which was 3.2% in 2000–1 and was assumed to measure 2.8% (the annual average rate for 1997–8 to 2001–2) until 2004, and the

Abbreviations: AIHW, Australian Institute of Health and Welfare; DALY, disability adjusted life years; DCIS, Disease Costs and Impact Study; DWLs, dead weight losses; NCHPE, National Centre for Health Program Evaluation; NPV, net present value; QALY, quality adjusted life year; YLL, years of life lost as a result of premature death; YLD, years of healthy life lost as a result of disability

projected growth of the population with visual impairment using the census and prevalence data.

Direct health cost projections to 2020 were calculated on a similar basis, using ABS medium projections (Series B) by age group for the demographic data. Even small technological breakthroughs in cost effective interventions could alter these cost projections significantly given the size of the populations impacted and the medium to long term timeframe. Policy initiatives targeting modifiable risk factors could also have substantial implications over the period.

To be conservative, where direct health costs are categorised as being the result of falls, fractures, motor vehicle accidents, or depression, they have not been partially attributed to visual impairment even though visual impairment may have contributed in some way.

Indirect costs

There are two types of indirect costs of visual impairment: the financial costs, because of the disabling nature of eye disease and its premature mortality rates, as well as the costs of carers, and of aids and modifications; and the non-financial costs from loss of healthy life, that are usually analysed in terms of the years of healthy life lost.

Usually indirect costs are all those costs that are not direct health system costs. However, the importance of making the economic distinction between real and transfer costs is recognised. Transfer costs are important when adopting a whole of government approach to policy formulation and budgeting.

Lost earnings and production ("human capital") focuses on the loss of production or earnings associated with illness and premature death. This analysis was limited by data constraints.

Employment rates are lower for people with visual impairment relative to the average Australian (after age standardisation), and the lost production can be calculated. It is assumed that, in the absence of visual impairment, these people would have been employed at the same rate as the average Australian.¹¹ However, the estimates are conservative as they do not take into account the reduced number of hours that people with visual impairment might work or their slower promotion. These data are not controlled for other comorbidities that may contribute to lower overall age standardised employment rates.

The mortality "burden" also assumes that in the absence of the illness, those people with visual impairment did not die in 2004, but rather were well and participated equally in employment. The average age at death of 40–64 year olds with visual impairment who die (57.2 years) and of those over 65 who die (82.8 years) is calculated from the demographic profile of deaths derived from the mortality rates and utilising the attributable fraction approach.⁷

Total \$1824.4m

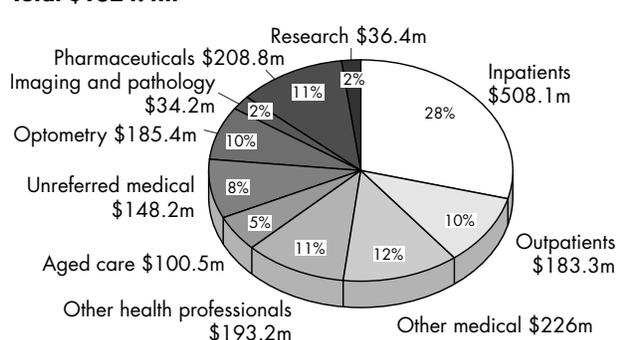


Figure 1 Direct eye care costs in Australia in 2004 for all disorders of the eye and adnexa.

Total \$1824.4m

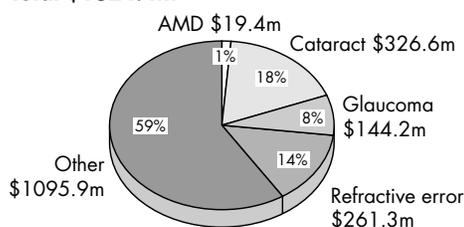


Figure 2 Direct costs in Australia in 2004 by type of eye condition. AMD, age related macular degeneration.

Expected retirement age is assumed to be 65 for those under 65 and average life expectancy (at age 65) for those 65 and over is 82.4 years for males and 86.0 years for females—84.2 years on average.⁶ The conservative discount rate used for the analysis for the net present value (NPV) of the future income stream was 1.55%.

People with visual impairment or their families and carers who work fewer hours or retire early will not only forego income, but will also pay less personal income tax. With visual impairment and lower income, there will be less consumption of goods and services, estimated up to the level of the disability pension. Without visual impairment, it is conservatively assumed that consumption would comprise 90% of income (the savings rate may well be lower than this). The indirect tax foregone is a product of the foregone consumption and the average indirect tax rate. Tax revenue sacrificed is included as a transfer payment (not a real economic cost).

Total carer costs were derived from data from two relatively small bottom up studies of carer and other indirect costs including the cost of special devices and equipment.^{12 13}

Real costs use up resources and include capital or labour, or reduce the economy's overall capacity to produce goods and services. In contrast, transfer payments involve payments from one economic agent to another and include taxation revenue or social welfare payments. This distinction is important to avoid double counting. The weighted average payment per annum was derived from the Centrelink website

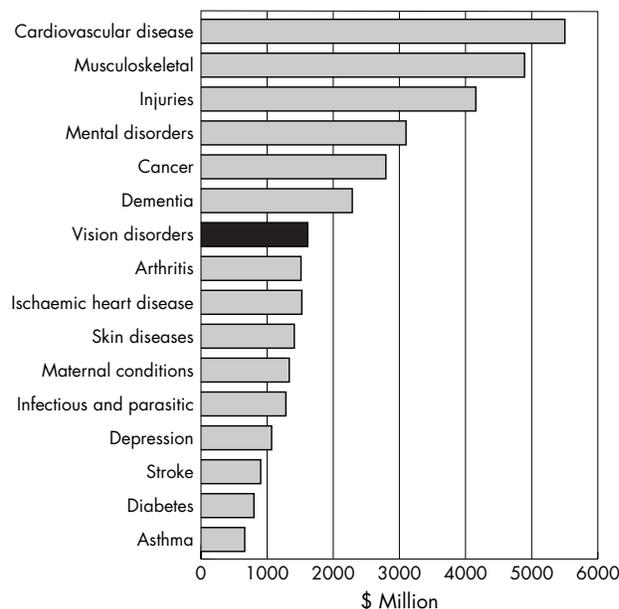


Figure 3 Comparison of the direct health costs of various health conditions in Australia for 2000–1.

(www.centrelink.gov.au) for each of the various payments, with weights split equally between singles and couples.⁷

Loss of wellbeing

People's suffering and premature death from the disabling and distressing symptoms of disease goes well beyond the financial costs. The overall impact of disease and premature death can be measured as "burden of disease" or "loss of wellbeing." This estimates disability adjusted life years (DALY). DALY has two components; the years of life lost (YLL) as a result of premature death—the mortality burden; and the years of healthy life lost as a result of disability (YLD)—the morbidity burden. Estimates for YLL for vision loss are not available.¹⁴

In any year, the disability weight of a disease (for example, 0.43 for vision loss) reflects a relative health state. This example would represent losing 43% of a year of healthy life because of the vision loss. The loss of wellbeing for vision loss was estimated for 1996 and projected using prevalence data.¹⁴

A statistical life in Australia is valued between A\$3.7m and A\$9.6m; with a mid-range estimate of A\$6.5m.⁶ The lower bound of A\$3.7m was conservatively used in the base case cost estimates. With a discount rate of 3.3%, this generates an estimate for the value of a life year as A\$162 561 per annum. This is lower than most international lower bounds on the estimate.¹⁵

RESULTS

Direct health costs

The direct financial healthcare costs in Australia in 2004 for all disorders of the eye and adnexa are estimated to total A\$1824.4m (fig 1). Cataract accounts for 18% of expenditure (fig 2). Based on 2000–1 comparative data the direct costs for eye disease ranks as the seventh highest disease expenditure (fig 3). The direct cost estimate does not include the special allocated funding for photodynamic therapy for macular degeneration that is estimated to be between A\$30–40m per annum.¹⁶

Indirect costs

The real indirect financial costs of visual impairment are estimated as A\$3.2 billion, around 76% more than total direct health costs (A\$1.8 billion) (fig 4). In addition, there were a further A\$850 million of transfer payments—both lost revenue (tax foregone for people with visual impairment and their families and carers) and expenditure (carer and other welfare payments). These are not included in the real cost estimates or the totals.

If those with visual impairment were employed in the workforce at the same rate as other Australians of the same age, there would be an extra 45 443 people in the workforce in 2004. With average weekly earnings of A\$752.30 per week, these workers would generate A\$1781m in additional income. The lost tax revenue from these lower earnings was A\$493m. This comprises A\$379m of personal income tax and A\$114m of indirect tax (sales tax, GST).

Total \$9.85bn

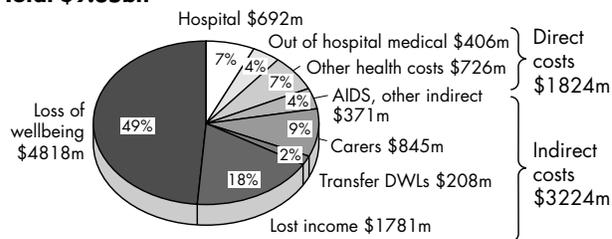


Figure 4 Composition of total costs for vision disorders in Australia for 2004.

The calculation of mortality burden is made separately for those aged 40–65 and for those aged over 65, based on numbers of deaths attributable to visual impairment. In all, 18 deaths of people under 65 and 566 deaths of people over 65 are attributable. Of these, 11 and 37, respectively, would have been employed. The net present value of the premature mortality burden is A\$5.3m. The net present value of taxation revenue sacrificed for the mortality burden is A\$1.5m.

The lost taxation revenue associated with lost earnings of carers during their caring activities was calculated to be A\$175.8m. Total estimated welfare transfers were A\$155m, with A\$7.7m of real dead weight losses (DWLs) and total estimated tax revenue losses are A\$695.4m, with A\$199.9m of real DWLs. In total, real DWLs from transfer payments for people with visual impairment are estimated to be A\$207.7m in 2004.

Loss of wellbeing

In Australia in 2004, the loss of wellbeing attributable (YLD) to visual disorders was estimated as 40 068 years. Based on the number of deaths, the number of years of life lost (YLL) as a result of visual impairment was estimated to be 1119 YLLs. This assumes that average life expectancy is 84.2 years and the discount rate is 3.3%. In total then, lost years of healthy life (YLL and YLD) in 2004 was 41 187 DALYs (table 1).

DALYs can be converted to a financial equivalent, by assuming a value for a statistical life year (VLY) to be A\$162 561. However, the net cost of suffering and premature death from visual impairment should exclude other personal costs—notably lost earnings, to avoid double counting.

From the total of A\$6.7bn lost earnings after tax (A\$1.27bn—that is, A\$1.79bn minus A\$0.52bn) have been deducted, as have personal payments for carers (A\$0.24bn) and for aids and other out of pocket expenses (A\$0.37bn). The net cost of loss of wellbeing is thus reduced from A\$6.70bn to A\$4.82bn.

DISCUSSION

Australia and other developed economies need to take vision loss seriously, as blindness and vision loss have huge and broad ranging impacts on our society. Even in a developed

Table 1 Estimates of years of life lost (YLL) as a result of visual impairment in Australia in 2004

	Deaths	Average age at death	Average life expectancy	Difference (years)	YLL
40–65	18	57.2	84.2	27.0	333
65+	566	82.8	84.2	1.4	785
Total	584				1,119

country like Australia, avoidable vision loss is a major problem now, and will increase with the changing demography. Although specific interventions may increase direct costs they should bring significant savings in both categories of indirect costs.

Blindness and cancer are the two most feared health conditions that people want to prevent.¹⁷ Australia has good tertiary and secondary eye care services. It also has some of the best data in the world, if not the best, on the distribution and impact of visual impairment.⁴ These data show the trebling of vision loss with each decade of life, with substantial impacts on independent living and the quality of life, and the issues presented by demographic ageing. The projected prevalence together with the cost and impact of vision loss presented in this report confirm the need to develop and utilise treatments and technologies to safeguard the eyesight of the increasing number of people who would otherwise lose vision.

Much can be done because so much blindness and vision loss can be prevented or treated with cost effective interventions. Half of visual impairment is correctable and one quarter is preventable.⁴ Well constructed strategies such as The Vision Initiative are available and should be implemented nationwide without delay.¹⁸

The real direct and indirect financial cost of vision loss represents A\$252 for every Australian or 0.6% of GDP. Eye care has a range of proved, low risk, high success and cost effective interventions, as measured by cost utility and cost effectiveness analysis, normally expressed as A\$/QALY (quality adjusted life year or one DALY avoided). For Australia, an intervention that costs between A\$37 000 to A\$112 000/QALY is regarded as being cost effective.⁷ If the cost is less than GDP per capita to avert one lost DALY, that is less than A\$37 000, it is considered to be very cost effective.

First eye cataract surgery costs around A\$2800 (US\$2020) per QALY and second eye cataract surgery was almost as cost effective at A\$3700 (US\$2727), converted at purchasing power parity of 0.7281.¹⁹⁻²⁰ The distribution of and access to eye care services need to be improved, especially the delivery models available in rural and remote Australia. Given the major impact of visual impairment, the 2 year long waiting lists for cost effective procedures like cataract surgery must seriously be reassessed.

Further research is necessary to address the questions of blindness and vision loss that currently are unable to be comprehensively treated, particularly conditions such as glaucoma and macular degeneration. Substantially increased public sector research funding through National Health and Medical Research Council and other bodies is needed. The funding in 2004 was A\$36.4 million. The exceptional returns to investment in health research and development from Australian health research and development have been documented and show a return of up to 5:1 for every dollar spent from 1960 to 1999.²¹ Research needs to be viewed as an investment in health outcomes for ourselves and our children.

There is a need for rehabilitation services for most people with vision loss; however, less than a quarter of people with vision loss access these services.²² Rehabilitation services have the potential to maintain quality of life and thus reduce the impact of visual impairment.

Further research is needed to develop models of effective services that can provide for greater numbers of people with impaired vision. The increase in numbers is not only from the ageing of the population but also from more effective referral services.

Even in a developed country vision loss imposes a tremendous cost. A country cannot afford avoidable vision

loss and specific initiatives and health policies need to be developed to address this issue.

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