

The cost of vision loss in Canada. 2. Results

Alan F. Cruess, MD, FRCSC*, Keith D. Gordon, PhD[†], Lorne Bellan, MD, FRCSC[‡],
Scott Mitchell, BEc[§], M. Lynne Pezzullo, BEc[§]

ABSTRACT • RÉSUMÉ

Objective: This study was conducted to provide the financial underpinnings necessary for effective planning for the provision of eye health services in Canada. Canada is facing an aging demographic and all the major eye diseases are diseases associated with aging. It is essential that we have information based on the best available data to support national and provincial vision health plans.

Design: The design associated with the prevalence-based approach used in this study was outlined previously in detail in *The Cost of Vision Loss in Canada: Methodology*.

Methods: The methods associated with the prevalence-based approach used in this study were previously outlined in detail in *The Cost of Vision Loss in Canada: Methodology*.

Results: The financial cost of VL in Canada in 2007 was estimated to be \$15.8 billion per annum: \$8.6 billion (54.6%) represents direct health system expenditure; \$4.4 billion (28.0%) was productivity lost due to lower employment, higher absenteeism, and premature death of Canadians with VL; \$1.8 billion (11.1%) was the dead weight losses (DWL) from transfers including welfare payments and taxation forgone; \$0.7 billion (4.4%) was the value of the care for people with VL; \$305 million (1.9%) was other indirect costs such as aids and home modifications and the bring forward of funeral costs. Additionally, the value of the lost well-being (disability and premature death) was estimated at a further \$11.7 billion. In per capita terms, this amounts to a financial cost of \$19370 per person with VL per annum. Including the value of lost well-being, the cost is \$33704 per person per annum.

Conclusions: There is a growing awareness in Canada and around the world of the impact of VL on health costs and on the economy in general. This awareness is supported by the growing number of independent studies on the cost of vision loss both nationally and globally. Because most of these studies are limited by the minimal amount of available data, the overall cost of vision loss is likely underestimated. Nevertheless, this study reports the cost of vision loss in Canada as being greater than previously reported, making the problem even more urgent to address. A comprehensive national vision health plan, that is a coordinated federal, provincial and territorial initiative dealing with all aspects of vision loss prevention, sight restoration, and vision rehabilitation is called for.

Objet : Présentation des résultats de notre étude sur les coûts de la perte visuelle (PV) au Canada. Cette étude a pour objet de mieux comprendre la nécessité des soutiens financiers pour planifier efficacement la provision de services de soins oculaires au pays.

Nature et Méthodes : La nature et les méthodes associées à une approche fondée sur la prévalence ayant servi à cette étude sont décrites à l'annexe 1.

Résultats : Le coût de la PV au Canada a été estimé en 2007 à 15,8 milliards de dollars par année : 8,6 milliards (54,6 %) représentent les dépenses directes du régime de santé; 4,4 milliards (28,0 %), la perte globale de productivité due à la baisse d'emploi, à la hausse de l'absentéisme et au décès prématuré des Canadiens suite à la PV; 1,8 milliard (11,1 %), les pertes sèches (PS) allant des transferts de paiement de bien-être à la taxation; 0,7 milliard (4,4 %), la valeur des soins pour les gens ayant une PV; 305 millions (1,9 %), les autres coûts indirects, tels les frais d'aide et de modification aux domiciles ainsi que l'ajout des frais funéraires. En outre, la valeur du bien-être perdu (invalidité et décès prématuré) a été estimée à un autre 11,7 milliards. Per capita, la somme des coûts financiers est annuellement de 19 370 \$ par personne ayant une perte visuelle. Avec valeur du bien-être perdu, le coût s'élève à 33 704 \$ par personne par année.

Conclusion : La sensibilisation concernant l'impact de la PV sur les coûts de la santé et l'économie s'accroît au Canada et dans le monde. Cela est soutenu par le nombre croissant d'études indépendantes sur le coût de la perte visuelle. Comme la plupart de ces études sont limitées par la faible quantité de données disponibles, le coût global de la perte visuelle est vraisemblablement sous-estimé. Néanmoins, cette étude signale que le coût de la perte visuelle au Canada est plus élevé qu'auparavant, rendant l'étude du problème encore plus urgente. Un plan national et global sur la santé oculaire, axé sur la prévention de la perte visuelle sous tous ses aspects, sur la restauration de la vie et la réadaptation visuelle s'impose.

This study was undertaken in response to the urgent need for reliable information on the cost of vision loss (VL) to form the underpinnings of a vision health plan for Canada. We believe it represents the first and most comprehensive study of its kind in that it uses all available Canadian data to assess the economic impact of VL in Canada.

METHODS

The cost of VL in Canada was estimated by using a prevalence-based approach, based primarily on the costs associated with the 5 major causes of visual impairment: age-related macular degeneration (AMD), cataract, diabetic retinopathy, glaucoma, and refractive error (RE).

From *Dalhousie University, Halifax Nova Scotia, Canada; †Canadian National Institute for the Blind, Toronto, Ontario, Canada; ‡University of Manitoba, Manitoba, Canada; and §Access Economics, Canberra, Australia

Originally received Dec. 3, 2010. Final revision Mar. 3, 2011. Accepted May 18, 2011

Correspondence to Keith D. Gordon, PhD, Vice President Research and Service Quality, CNIB, Adjunct Professor, Department of Ophthalmology and Vision Sciences, University of Toronto, 1929 Bayview Avenue, Toronto, Ontario M4G 3E8; email: keith.gordon@cnib.ca

Can J Ophthalmol 2011;46:315–318

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Table 1—Prevalence of VL in Canada, by cause and ethnicity, 2007

	All Ethnicities		White		AVM*	
	Number	% Total	Number	% Total	Number	% Total
AMD	89241	10.9	84641	10.8	4380	12.0
Cataract	133836	16.4	120685	15.5	13151	36.1
DR	29920	3.7	20992	2.7	8928	24.5
Glaucoma	24937	3.1	22565	2.9	2373	6.5
RE/other	539236	66.0	531650	68.1	7586	20.8
All VL	817171	100.0	780534	100.0	36417	100.0

*Canadian First Nations people or visible minorities.
 Note: AMD, age-related macular degeneration; DR, diabetic retinopathy; RE, refractive error; VL, vision loss.

The total cost of VL related health expenditures was estimated based on a combination of a “top down” approach (using national expenditures on all forms of treatment for eye conditions with VL) and “bottom up” (using known costs of specific eye care procedures). The specific methods required for the top down estimates have been outlined in a previous article.¹ Expenditures consist of a combination of direct health system expenditures on visually impairing eye conditions, as well as other indirect financial costs associated with VL, such as productivity losses. The burden of disease associated with VL was measured in terms of disability adjusted life years (DALYs). Methods for estimation of this outcome are also outlined in a previous article.¹

For a bottom up approach, estimates were undertaken for each of the 5 major eye diseases either for total expenditure, or by the categories covered under the top down approach, but for each individual disease.²

For AMD, Cruess et al.³ estimated the total health system cost of AMD at \$858.7 million. As these estimates apply to 2005, allowing for cumulative inflationary increases of 4.7% yields the total for 2007 health system expenditure for AMD.

For uncorrected RE, the assumption was made that most of the NHEX category “vision care”⁴ would be attributable to RE. It was also assumed that RE required little in the way of hospital care, physicians, drugs, or the other institutional-based expenses.

For glaucoma, the ratio of glaucoma drug expenditure to total NHEX⁴ “nervous system and sense organ disorders” drug expenditure (10.2%) was assumed to hold for glaucoma’s share of total nervous system and sense organ disorders health system expenditure.

Total expenditure on cataract surgery was estimated taking the value from 2004 to 2005 from the Canadian Institute of Health Information’s National Grouping System⁵ and allowing for inflation to 2007. It was assumed that most such surgery takes place in hospitals, then given hospitals account for 28.4% of total health system expenditure, the same ratio would hold for cataract, yielding the total health system expenditure for cataract.

For diabetic retinopathy (DR), costs are assumed to be the same as the average for the other diseases (\$6875/person/year), which is applied against the total of 29920 people with VL from DR.

The total health system expenditure on VL was scaled up to account for factors such as capital expenditure, research, public health, and other unallocated health expenditure. For consistency, the same markup (25.2%, taken from NHEX⁴) was used for each of these expenditures, to give the total bottom up estimate.

RESULTS

Prevalence of major eye conditions

The prevalence of the 5 major eye conditions by population group was estimated to be that shown in Table 1. The estimated prevalence rate for each condition is shown in Figure 1.

In total, there were an estimated 817171 Canadians with VL in 2007. Of this total, 780534 (95.5%) were white and 36417 (4.5%) were Canadian First Nations people or visible minorities (AVM). RE/other is the main source of VL for the white population (66% of the total), and cataract is the main cause of VL in AVM groups (36% of the total). For whites the second largest source of VL is cataract (16.4%) and, for the AVM population, DR is the second largest source (24.5% of the total). AVM have a lower prevalence of VL for all diseases other than DR (Fig. 1). The prevalence of VL is projected to increase from 2.5% of the population in 2007 to 4.0% in 2032. In absolute numbers, there are projected to be almost twice as many Canadians with VL in 25 years than in 2007, with VL from cataract, AMD and glaucoma all projected to increase by >100% over this period (114%, 113%, and 117%, respectively).

Health system expenditures (top down)

The total costs of VL related expenditures utilizing the top down approach are shown in Table 2.

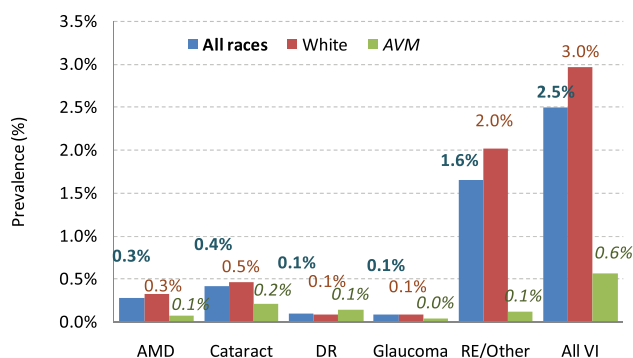


Fig. 1—Prevalence rates of VL in Canada by ethnicity and cause (2007).

Table 2—Estimated VL health system expenditure (top down), 2007

Type of Cost	Total (\$ Million)
Hospitals	1497.7
Physicians	866.5
Pharmaceuticals	563.5
Vision care (optometry, ophthalmology, lenses)	3483.7
Research	37.5
Other institutions	444.8
Other (capital, public health, administration, other institutions, professional services)	1740.3
Total	8637.9

Note: VL, vision loss.

Health system expenditure (bottom up)

Estimating from the bottom up, the total health system expenditure on VL in Canada in 2007 was \$7.04 billion as shown in Table 3.

Summary of health system expenditures

The bottom up estimate is around 18.5% lower than the top down estimate derived earlier. Most of this difference would be due to the fact that the bottom up estimate only includes the “big 5” eye diseases (cataract, DR, glaucoma, AMD, RE). For example, Maberley et al.⁶ in their study of VL in one Canadian city, found that 12% of VL was caused by visual pathway disease (that is not included in the bottom up estimates). Accordingly, our consultants and the authors have a preference to err on the side of caution, and in this case, the top down estimate is considered more reliable. Thus the total cost of VL-related health expenditure in Canada is estimated as \$8637.9 million in 2007. This equates to \$10570 per person with VL per annum.

Other financial costs

In total, the non health-related costs of VL were estimated to be \$7.1 billion as shown in Table 4. The relative contribution that each financial cost makes to the total cost of vision loss is shown in Figure 2.

The burden of disease

The main cost of VL is the loss of well-being and quality of life it entails. Although this is not a financial cost, it is an important measure of the human toll caused by vision loss. It also provides a benchmark for public policy makers to

Table 3—Estimated VL health system expenditure (bottom up), 2007

Eye Condition	Total (\$ Million)
AMD	898.9
RE	3480
Glaucoma	549
Cataract	481
DR	205.7
Total before scale up (25.2%)	5615
Grand total	7040

Note: AMD, age-related macular degeneration; DR, diabetic retinopathy; RE, refractive error; VL, vision loss.

Table 4—Total non health-related costs of VL, 2007

Type of Cost	Value (\$ Million)
Productivity losses	4431
Care costs	693
Aids and modifications	305
DWL	1757
Total non health financial costs	7186

Note: DWL, dead weight loss; VL, vision loss.

compare different diseases. This loss of well-being was calculated according to the methodology outlined in The Cost of Vision Loss in Canada: Methodology¹ and was found to be 77306 DALYs. Converting this number to a \$ value by multiplying by the value of a statistical life year and converting the gross costs obtained to net costs resulted in an estimated net cost of lost well-being from VL of \$11.7 billion in 2007.

DISCUSSION

In 2007, the financial cost of VL was \$15.8 billion. Of this: \$8.6 billion (54.6%) was direct health system expenditure; \$4.4 billion (28.0%) was productivity lost due to lower employment, absenteeism and premature death of Canadians with VL; \$1.8 billion (11.1%) was the DWL from transfers including welfare payments and taxation forgone; \$0.7 billion (4.4%) was the value of the care for people with VL; and \$305 million (1.9%) was other indirect costs such as aids and home modifications and the bring-forward of funeral costs. Additionally, the value of the lost well-being (disability and premature death, not a financial cost) was a further \$11.7 billion.

In per capita terms, this amounts to a financial cost of \$19370 per person with VL per annum. Including the value of loss of well-being, the cost is \$33704 per person per annum.

In the last few decades, expenditure on health care in Canada has been growing rapidly—considerably faster than Gross Domestic Product. However, expenditure on vision care has risen even faster, growing from 1.8% of total health expenditure in 1975 to 2.2% in 2007.⁴

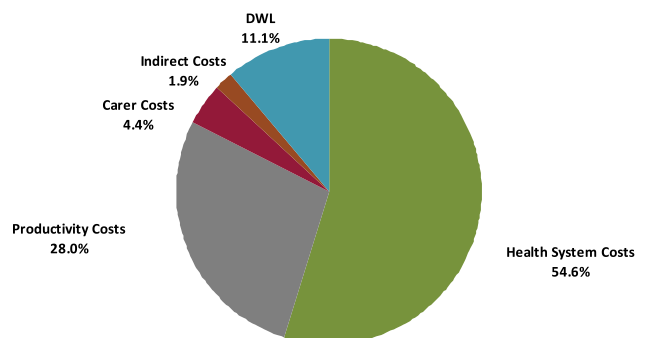


Fig. 2—Financial costs of VL by type of cost (% total).

