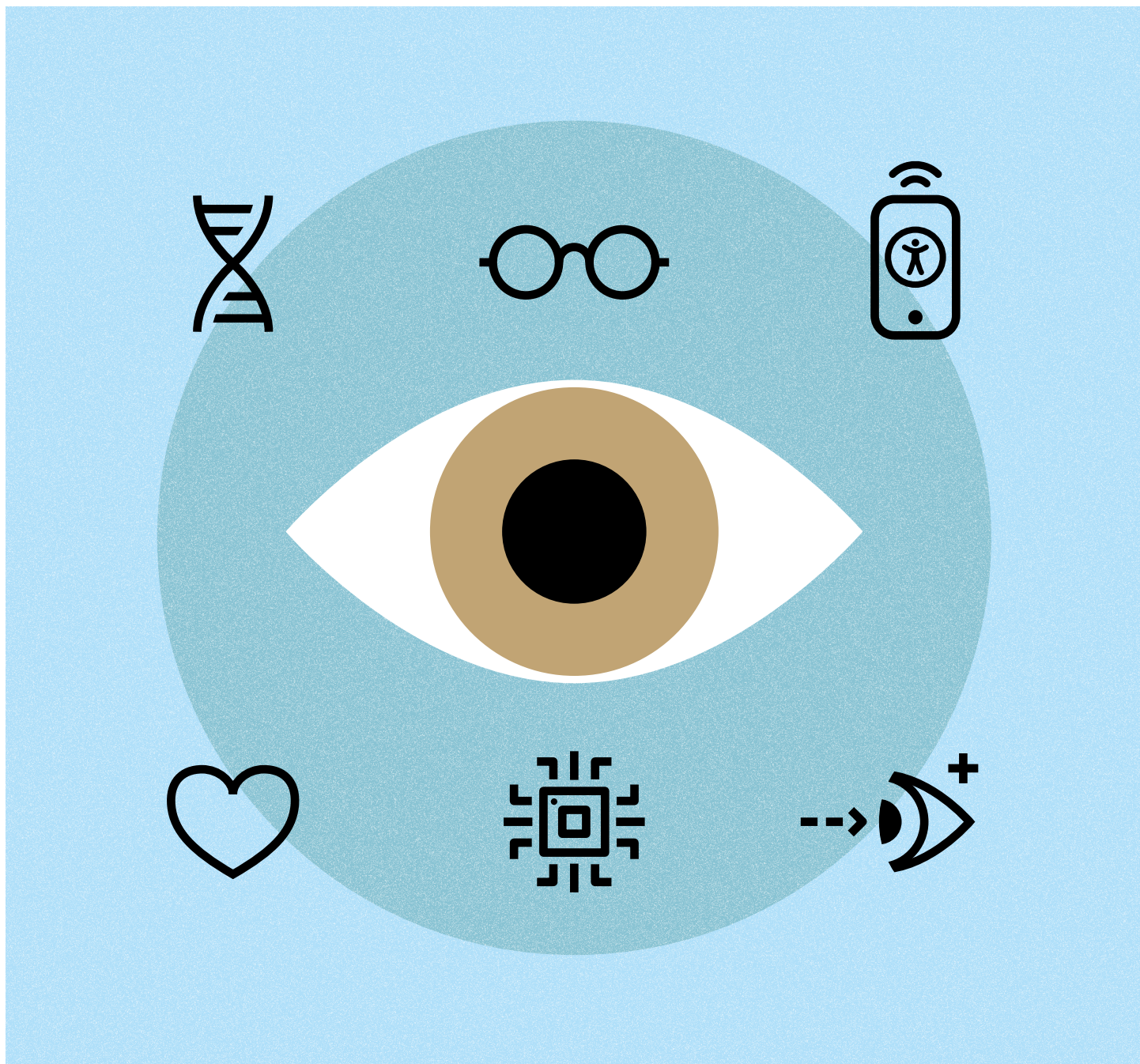

A REPORT CARD ON

Vision Health in Canada

2023

Commissioned by the Canadian Council of the Blind
and Fighting Blindness Canada



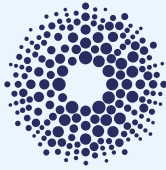
Keith D. Gordon, Ph.D., M.Sc. (Epid.)
Senior Research Officer, Canadian Council of the Blind

October 2024

CANADIAN COUNCIL
OF THE BLIND



LE CONSEIL CANADIEN
DES AVEUGLES



**FIGHTING
BLINDNESS
CANADA**

**VAINCRE
LA CÉCITÉ
CANADA**

There is clearly a significant need to educate the public about the need for regular eye examinations and their eye health in order to allow for early detection and treatment of eye diseases that may mitigate or prevent vision loss.

1. Table of Contents

2. List of Figures	6
3. List of Tables	6
4. Glossary	7
5. Background	8
6. Executive Summary	8
7. Recovery from the Impact of the Pandemic	12
7.1 Ophthalmic Day Surgery	12
7.2 Pharmaceutical Claims	13
7.3 Vision Care	16
7.4 Medical Research	17
7.5 Wait Times for Cataract Surgery	17
7.6 Ophthalmic Drug Approval and Reimbursement	21
7.6.1 Biosimilars	22
8. Emerging Issues	23
8.1 Vision Health Workforce Projections	23
8.1.1 Ophthalmologists	23
8.1.2 Optometrists	23
8.2 The Myopia Epidemic	25
8.3 The Need for Regular Eye Examinations	25
8.4 Gene Therapy	26
8.5 Micro-Invasive Glaucoma Surgery and Minimally Invasive Bleb Surgery	27
8.6 Geographic Atrophy	28
8.7 Artificial Intelligence	28
8.7.1 Diagnosis of Eye Diseases	29
8.7.2 Screening for Diabetic Retinopathy	29
8.7.3 Prediction of Disease Progression	29
8.7.4 Triage and Practice Management	29
8.7.5 The Role of AI in Cataracts	30

8.7.6 The Use of AI in Accessible Technology for People Who Are Blind or Partially-Sighted	30
8.8 Assistive Devices Programs	31
9. Eye Health Practitioners' Perspective	36
9.1 Ophthalmologists	37
9.1.1 Long-Lasting Impact of the Pandemic	37
9.1.2 Challenges Facing Professional Practice	37
9.1.3 Government and Policy Considerations	38
9.1.4 Patient Education and Eye Health	39
9.1.5 Innovation and Future Directions	40
9.2 Optometrists	40
9.2.1 Impact of the Pandemic on Practice	40
9.2.2 Challenges in Practice	41
9.2.3 Eye Examination Trends	42
9.2.4 Government and Systemic Issues	42
9.2.5 Role of Technology and Innovation	43
9.2.6 Optimism and Future Needs	43
10. Perspectives on Indigenous Eye Health	44
11. Acknowledgement	46
12. Appreciation	46
13. Research Leads	47
Dr. Keith Gordon, Principal Investigator	47
Dr. Chad Andrews, Investigator	47
Dr. Larissa Moniz, Investigator and Project Co-Lead	48
Ian White, Investigator	48
Michael Baillargeon, Project Co-Lead	49
14. Endnotes	50

2. List of Figures

Figure 1. Claims for total ophthalmic preparations 2018 – 2023 14

Figure 2. Pharmaceutical claims by pharmaceutical subgroup 2018 – 2023 15

Figure 3. Canada. 90th percentile (number of days for 90% of cataract patients to receive treatment) 18

Figure 4. Percentage of Canadians undergoing cataract surgery within benchmark time frame by year 2018 –2023 19

3. List of Tables

Table 1. Comparing vision health and health care 2023 vs. 2021 9

Table 2. Ophthalmic day surgeries 2019 – 2023 13

Table 3. Claims for total ophthalmic preparations 2018 – 2023 14

Table 4. Pharmaceutical claims by pharmaceutical subgroup 2018 – 2023 16

Table 5. Canada. 90th percentile (number of days for 90% of cataract patients to receive treatment) 18

Table 6. Percentage of Canadians undergoing cataract surgery within benchmark time frame and number of days for 90% of cataract patients to receive treatment by year 2018 – 2023 19

Table 7. 90th percentile by province (number of days for 90% of cataract patients to receive treatment) 20

Table 8. Percentage of Canadians by province undergoing cataract surgery within benchmark time frame 21

Table 9. Number of optometrists by province in Canada in 2023 24

Table 10. Assistive devices programs available in Canada 33

4. Glossary

Acronym	Full Name
ADP	Assistive Devices Program
AI	Artificial intelligence
AMD	Age-related macular degeneration
Anti-VEGF	Anti-vascular endothelial growth factor
CAO	Canadian Association of Optometrists
CCB	Canadian Council of the Blind
CIHI	Canadian Institute for Health Information
CIHR	Canadian Institutes of Health Research
COS	Canadian Ophthalmological Society
DME	Diabetic macular edema
DR	Diabetic retinopathy
FBC	Fighting Blindness Canada
FDA	United States Food and Drug Administration
GA	Geographic atrophy
MIBS	Minimally invasive bleb surgery
MIGS	Micro-invasive glaucoma surgery
NHEX	National Health Expenditure Database
NIHB	Non-Insured Health Benefits
NOC	Notice of Compliance
VLRC	Vision Loss Rehabilitation Canada

5. Background

In October of 2022, the Canadian Council of the Blind (CCB) and Fighting Blindness Canada (FBC) issued a report card to assess the impact of the COVID-19 pandemic on vision health in Canada. The report card found an overall improvement in vision health in 2021 compared with the first year of the pandemic (2020), but that services and wait times had not returned to pre-pandemic levels. In order to ascertain the current state of vision health in Canada and to determine whether vision health has fully recovered from the effects of the pandemic, an updated assessment of the issues has been undertaken using data from 2022 and 2023.

This report includes quantitative data from various Canadian sources as well as a more in-depth discussion of vision care challenges through interviews with ophthalmologists and interviews and a survey of optometrists.

6. Executive Summary

The overall finding of the current study is that, by and large, vision health has returned to the situation that existed prior to the pandemic. However, taking into account growth and aging of the population, there is concern that the strain on health care services and resources will continue to grow.

The main findings from the report are summarized in **Table 1**.

Table 1. Comparing vision health and health care 2023 vs. 2021

Issue	How did we rate then (2021 data)?	How do we rate now (2023 data)?
Surgery capacity and wait times	Canada was recovering from the impact of the pandemic on surgery cancellation but had not yet achieved the pre-pandemic surgical volume. This also meant that the backlog continued to increase.	The study found that in all categories the number of surgeries in April to December 2023 had reached the number for the same period in 2019 but did not show a significant increase over the 2019 numbers. The finding that post-pandemic volumes are about the same as they were prior to the pandemic means that wait times will continue to grow as the backlog has added to the number of people needing surgery. Ophthalmologists interviewed for this study confirmed that they were experiencing significant surgical backlogs.
Pharmaceutical claims	Total ophthalmic pharmaceutical claims were 11.7% fewer than would have been expected if growth had continued at the pre-pandemic rate.	Pharmaceutical claims have recovered from slowdowns during the pandemic. Claims in 2023 were 9.1% greater than in 2019.
Anti-VEGF injections	The number of anti-VEGF injections in 2021 was significantly fewer than expected but this may have been due in part to extended treatment regimens and people who were impacted by the lack of optometry visits in 2020 not being diagnosed.	The number of anti-VEGF injections in 2023 exceeded those for 2019 by 24%. Both ophthalmologists and optometrists interviewed for this study reported patients who had lost vision due to missed appointments during the pandemic but this situation seems to be greatly reduced currently.

Issue	How did we rate then (2021 data)?	How do we rate now (2023 data)?
Eye health care workforce	Shortages of nursing and allied staff were reported as a problem in ophthalmologists' and optometrists' offices and clinics.	Shortages of ophthalmologists, optometrists, and nursing and allied staff continue to be a challenge.
Optometric eye examinations	The number of optometric visits increased in 2021 compared with 2020 but remained below 2019 levels. This put people at risk of vision loss due to the potential of late diagnosis and treatment.	While there is no available data on the number of optometric visits in 2022 or 2023, expenditure on vision care increased by 24% in 2023 compared with 2019, indicating that optometric visits are at or above pre-pandemic levels. Both ophthalmologists and optometrists interviewed for this study identified regular eye examinations as the most important thing an individual can do to maintain their vision health.
Funding for vision research	The level of funding for vision research in 2021 was unchanged compared with 2019. Canada is failing badly on this issue.	The level of funding for vision research in 2023 was estimated at \$26.2 million, a 23% increase compared to 2019 and 2021. However, this is still far beneath what is required.
Wait times for cataract surgery	Wait times continued to be high. Wait times for cataract surgery had improved compared with 2020 but had not recovered to even pre-pandemic levels, thereby increasing the backlog.	While all provinces showed an improvement in wait times for cataract surgery compared with 2021, wait times are still above pre-pandemic values.

Issue	How did we rate then (2021 data)?	How do we rate now (2023 data)?
Ophthalmic drug approvals	The time to provincial reimbursement following Health Canada approval for some important medications was too long and was resulting in people being unable to afford sight-saving medications. There was also lack of equity in access to medicines depending on the province that patients lived in.	There were no ophthalmic new product entities approved by Health Canada in 2023. While the provincial reimbursement status of most medications has improved over the past two years, it is still taking around two years or more after Health Canada approval for the provinces and territories to reimburse sight-saving medications.
A national vision health strategy and a vision desk at the Public Health Agency of Canada	A private member's bill to have the federal government establish a national health strategy had been introduced into Parliament and achieved first reading.	Bill C-284, an Act to establish a national strategy for eye care, was unanimously approved by the House of Commons and passed second reading in the Senate as of May 29 th , 2024.

This report also addresses the following emerging issues:

- **The myopia epidemic:** Optometrists reported seeing an increase in the prevalence and severity of myopia in the population and attribute this to a lack of outdoor activity in their patients and increased use of digital devices.
- **Gene therapy:** Health Canada approved the first gene therapy for an inherited retinal disease in 2020. Considering the number of other gene therapies in clinical trials, there is a strong likelihood that others will be available in the coming years.
- **Micro-invasive glaucoma surgery (MIGS) and minimally invasive bleb surgery (MIBS):** While these devices are available for use in all provinces, patients face inequitable access to them as dedicated province-wide funding does not exist anywhere in Canada.
- **Geographic atrophy (GA):** New therapies for the treatment of GA, for which there are no currently available treatments, offer hope.

- **Artificial intelligence (AI):** AI offers potential for the diagnosis and treatment of eye diseases, for eye care practice management, and for devices that are changing the lives of people who are blind or partially-sighted.
- **Assistive Devices Programs (ADPs):** This report reviewed the programs in each province and territory and strongly recommends that the federal government create and mandate a national ADP to offset the cost of independence-granting assistive devices for all blind and partially-sighted Canadians.
- **Indigenous eye care:** Three optometrists who identified as Indigenous were interviewed for this study. All recommended a different way of administering vision health for Indigenous populations as well as the need to train more Indigenous optometrists and ophthalmologists.

7. Recovery from the Impact of the Pandemic

7.1 Ophthalmic Day Surgery

Canadian Institute for Health Information (CIHI) data was used to compare the number of day surgeries from April to December 2023 to the same period in 2019 to 2022 (**Table 2**).

This study found that in all categories the number of surgeries in 2023 was similar to 2019. This shows that surgical capacity has returned to pre-pandemic levels. However, the lack of significant increase in capacity compared to 2019 demonstrates an ongoing need for surgical capacity. It is likely that wait times will continue to grow as the system struggles to deal with the backlog that developed during the pandemic as well as a growing and aging population.

A recent study¹ reported that in order to overcome the backlog situation, public funding was funnelled into private for-profit surgical centres, resulting in a situation where more Ontarians of higher socioeconomic status were treated through the private centres. The private centre surgical rate rose 22% for patients in the highest socioeconomic status group, whereas the rate fell by 9% for patients in the lowest socioeconomic status group.

It is concerning that resources allocated for the purpose of overcoming the backlog create a situation in which access to cataract surgery favours people of higher socioeconomic status.

This was corroborated by ophthalmologists interviewed for this report, who report experiencing a greater than usual number of patients and express that this is leading to increased wait times.

Table 2. Ophthalmic day surgeries 2019 – 2023

	Day surgeries April – Dec. 2019 (‘000)	Day surgeries April – Dec. 2020 (‘000)	Day surgeries April – Dec. 2021 (‘000)	Day surgeries April – Dec. 2022 (‘000)	Day surgeries April – Dec. 2023 (‘000)
Cataract	159.2	108.5	142.7	155.6	165.3
Glaucoma	6.8	4.9	5.7	6.3	7.2
Disorders of refraction	0.9	0.6	0.9	1.0	1.0
Retinal disorders	4.1	3.1	3.9	3.6	4.0
Total	171.0	117.1	153.2	166.5	177.5

Source: CIHI special data request.

Note: Procedures-related data was only available for Ontario, Alberta, Nova Scotia, Prince Edward Island, and Manitoba. Consequently, the total provided in the table is lower than the number of services performed across Canada. This data cannot be compared with that in the 2022 report as that data included day clinics data. The current data is for day surgery only.

7.2 Pharmaceutical Claims

This report uses pharmaceutical claims as a proxy for assessing the extent to which people are obtaining treatment. Total ophthalmic pharmaceutical claims for both 2022 and 2023 exceeded the number of pre-pandemic claims. The claims for 2023 were 9.1% greater than in 2019 (**Figure 1** and **Table 3**). This same trend is observed in all pharmaceutical sub-categories (**Figure 2** and **Table 4**). To the extent that pharmaceutical claims reflect the return of ophthalmic medical and surgical care to pre-pandemic levels, it seems fair to say that the volume of ophthalmic care has rebounded and now exceeds that experienced before the pandemic.

Figure 1. Claims for total ophthalmic preparations 2018 – 2023²

Total ophthalmic preparations ('000 claims)

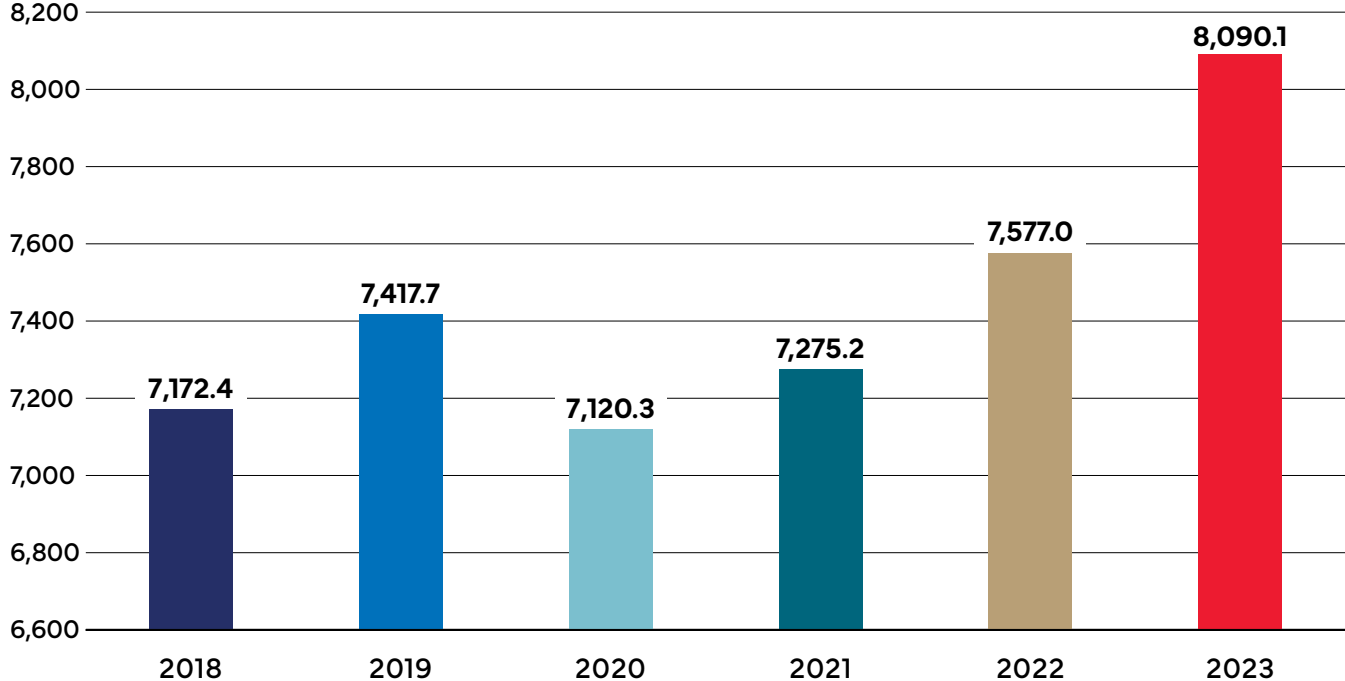
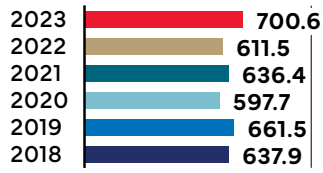


Table 3. Claims for total ophthalmic preparations 2018 – 2023

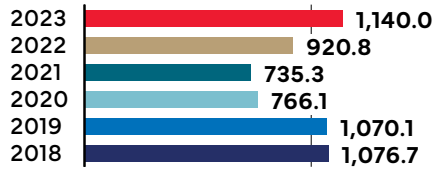
Year	Total ophthalmic preparations ('000 Claims)
2018	7,172.4
2019	7,417.7
2020	7,120.3
2021	7,275.2
2022	7,577.0
2023	8,090.1

Figure 2. Pharmaceutical claims by pharmaceutical subgroup 2018 – 2023

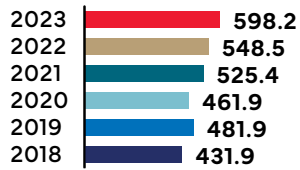
Anti-allergics/antihistamines



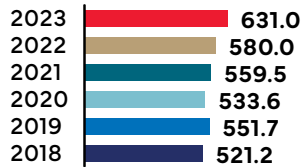
Anti-infectives



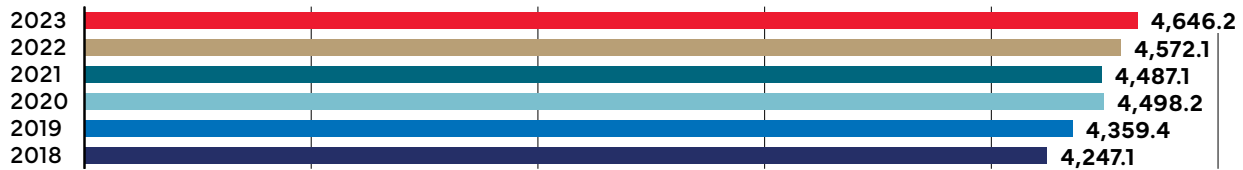
Anti-neovascularization products



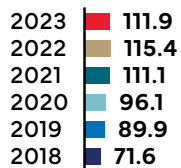
Dry eye products



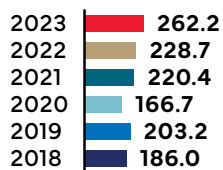
Miotics/anti-glaucoma products



Mydriatic/cycloplegics



Non-steroidal anti-inflammatories



0 1,000 2,000 3,000 4,000 5,000

Table 4. Pharmaceutical claims by pharmaceutical subgroup 2018 – 2023

	2018	2019	2020	2021	2022	2023
Anti-allergics/antihistamines	637.9	661.5	597.7	636.4	611.5	700.6
Anti-infectives	1,076.7	1,070.1	766.1	735.3	920.8	1,140.0
Anti-neovascularization products	431.9	481.9	461.9	525.4	548.5	598.2
Dry eye products	521.2	551.7	533.6	559.5	580.0	631.0
Miotics/anti-glaucoma products	4,247.1	4,359.4	4,498.2	4,487.1	4,572.1	4,646.2
Mydriatic/cycloplegics	71.6	89.9	96.1	111.1	115.4	111.9
Non-steroidal anti-inflammatories	186.0	203.2	166.7	220.4	228.7	262.2

7.3 Vision Care

While there is no available data on the number of eye examinations that occurred in 2023 and 2022, the total expenditures on vision care in Canada can be used to gain a picture of the extent to which optometric practice had returned to pre-pandemic levels. According to the National Health Expenditure Database (NHEX),³ the total cost of vision care in Canada in 2023 was estimated to have increased by 4.7% compared with 2022, and by 12.9% compared with 2021. The total cost of vision care in 2023 exceeded that for 2019 by 24.0%, thereby providing one indication that optometric practice had returned to pre-pandemic levels.

7.4 Medical Research

The total funds spent on vision-related medical research were assessed using similar methodology as previous reports. Briefly, the Canadian Institutes of Health Research funding decisions database⁴ was searched using the same keywords used in previous reports.⁵ This amount was added to the amount awarded by other vision grant funders (FBC,⁶ the Glaucoma Research Society of Canada,⁷ and the Quebec Vision Sciences Research Network⁸). Based on this analysis, the total investment in vision medical research in 2023 is estimated to be \$26.2 million, a 23% increase from 2021 (\$21.3 million) and a 25% increase from 2019 (\$20.9 million).

7.5 Wait Times for Cataract Surgery

Wait times for cataract surgery were obtained from the CIHI.⁹

Looking at national trends, while there has been some improvement compared to wait times during the pandemic, wait times are still above pre-pandemic values, with 90% of patients waiting 241 days for cataract surgery compared to 219 days in 2019 (**Figure 3** and **Table 5**). Nationally, in 2023 the percentage of patients being treated within the benchmark 112 days was 70%, the same as in 2018 and 2019 (**Figure 4** and **Table 6**). This also represents a marked improvement from 2020, when the percentage dropped to 45%.

Looking at wait times on a province-by-province basis, there is a wide discrepancy between provincial wait times and in their recovery from the pandemic (**Tables 7** and **8**). Interestingly, four provinces (Manitoba, Saskatchewan, Alberta, and British Columbia) have not only recovered but have also shown improvement, in some cases dramatic improvement, over their pre-pandemic wait times. Other provinces (Newfoundland and Labrador and Prince Edward Island) are still lagging far behind their pre-pandemic wait times. The remainder of the provinces (Nova Scotia, New Brunswick, Quebec, and Ontario) have shortened wait times that grew during the pandemic but haven't yet recovered to pre-pandemic levels.

Figure 3. Canada. 90th percentile (number of days for 90% of cataract patients to receive treatment)

Canada – 90th percentile (days)

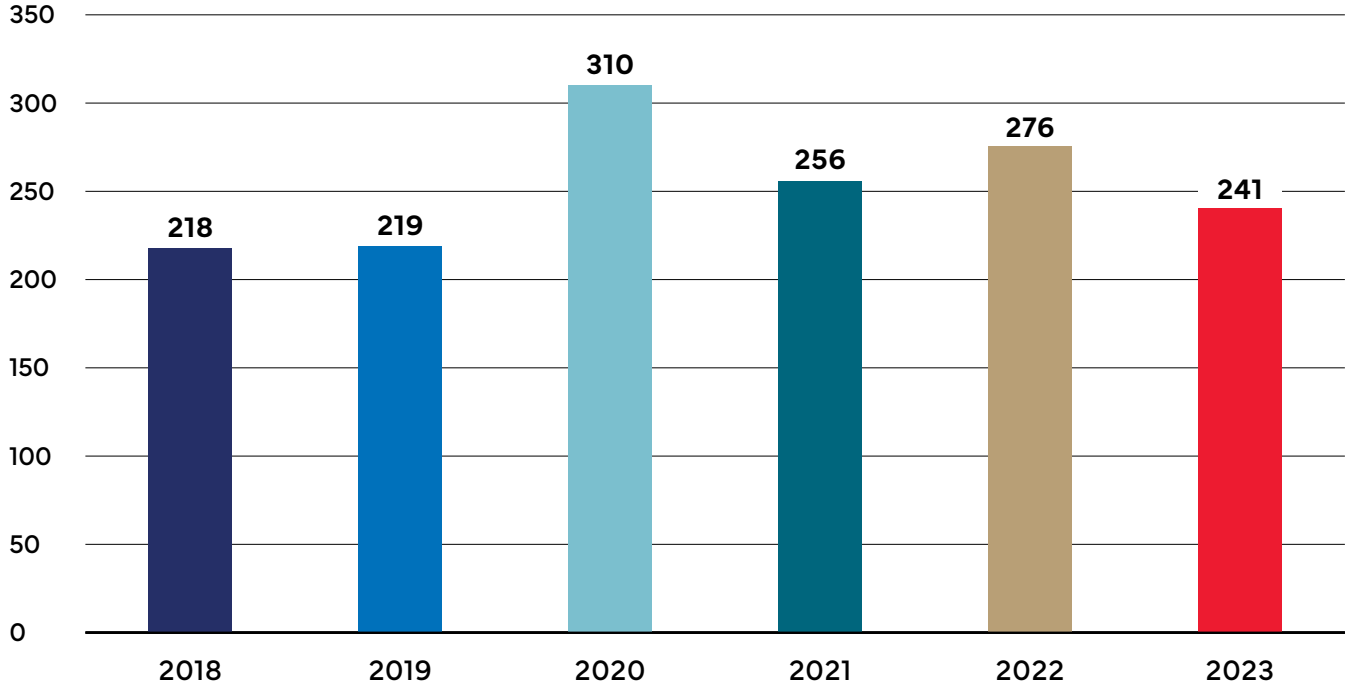


Table 5. Canada. 90th percentile (number of days for 90% of cataract patients to receive treatment)

Year	90 th percentile (days)
2018	218
2019	219
2020	310
2021	256
2022	276
2023	241

Figure 4. Percentage of Canadians undergoing cataract surgery within benchmark time frame by year 2018 – 2023

Canadians treated within benchmark time frame (%)

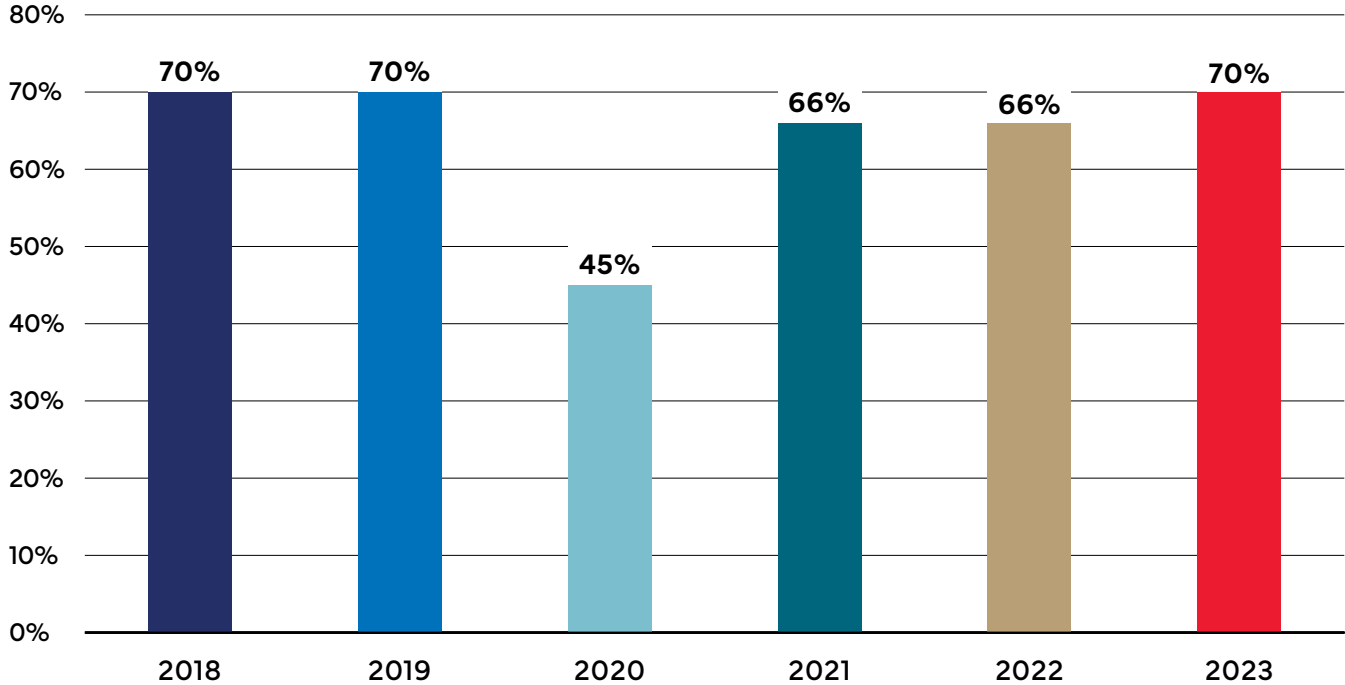


Table 6. Percentage of Canadians undergoing cataract surgery within benchmark time frame and number of days for 90% of cataract patients to receive treatment by year 2018 – 2023

Year	Percentage of Canadians treated within benchmark time frame	90 th percentile (days)
2018	70%	218
2019	70%	219
2020	45%	310
2021	66%	256
2022	66%	276
2023	70%	241

Table 7. 90th percentile by province (number of days for 90% of cataract patients to receive treatment)

	90th percentile (number of days for 90% of cataract patients to receive treatment)					
	2018	2019	2020	2021	2022	2023
Newfoundland and Labrador	153	209	474	279	433	351
Nova Scotia	229	250	394	258	293	271
New Brunswick	230	226	292	222	299	317
Prince Edward Island	302	356	467	324	430	623
Quebec	151	145	248	231	249	212
Ontario	222	223	303	285	327	282
Manitoba	378	422	448	516	574	371
Saskatchewan	203	235	314	251	267	209
Alberta	320	356	396	266	259	244
British Columbia	253	231	306	218	163	153

Table 8. Percentage of Canadians by province undergoing cataract surgery within benchmark time frame

	Percentage of Canadians undergoing cataract surgery within benchmark time frame					
	2018	2019	2020	2021	2022	2023
Newfoundland and Labrador	77%	63%	33%	42%	39%	43%
Nova Scotia	68%	60%	32%	63%	59%	69%
New Brunswick	67%	66%	53%	71%	62%	66%
Prince Edward Island	48%	28%	16%	30%	40%	21%
Quebec	83%	82%	53%	68%	68%	72%
Ontario	70%	72%	40%	60%	59%	65%
Manitoba	29%	33%	21%	39%	43%	63%
Saskatchewan	62%	61%	40%	63%	63%	69%
Alberta	49%	44%	35%	64%	66%	61%
British Columbia	64%	69%	52%	76%	81%	83%

7.6 Ophthalmic Drug Approval and Reimbursement

There have been no ophthalmic new product entities approved by Health Canada in 2023.¹⁰ Eylea HD (afibercept 8mg) was approved by Health Canada on February 2nd, 2024.¹¹ Eylea HD is indicated for the treatment of neovascular age-related macular degeneration (AMD) and diabetic macular edema (DME).

Levodexa, a combination dexamethasone/levofloxacin product based on previously approved medicinal ingredients, was approved by Health Canada in December 2023¹² for the prevention and treatment of inflammation and the prevention of infection associated with cataract surgery.

Susvimo, an intravitreal implant containing ranibizumab, indicated for the treatment of neovascular AMD, is under Health Canada review. While the drug formulation was approved on September 14th, 2022, the medical device authorization is currently under review, and, as such, is not marketed in Canada at this time.

The last Report Card on Vision Health in Canada reported on the reimbursement status of five ophthalmic medications that had received Health Canada approval (Notice of Compliance [NOC]) between 2018 and 2022.

As of May 27th, 2024, the following is the reimbursement status of these five medications¹³:

- **Beovu:** NOC received March 2020. Currently reimbursed in Alberta, Saskatchewan, Ontario, New Brunswick, Prince Edward Island, Newfoundland and Labrador, and the Non-Insured Health Benefits (NIHB) formulary.
- **Vyzulta:** NOC received February 2018. Currently reimbursed in all provinces and territories.
- **Oxervate:** NOC received February 2019. Not reimbursed in any province or territory.
- **Ozurdex:** NOC received April 2015. Only reimbursed in Quebec.
- **Vabysmo:** NOC received May 2022. Currently reimbursed in Alberta, Ontario, Quebec, New Brunswick, Prince Edward Island, Nova Scotia, Newfoundland and Labrador, Northwest Territories, the NIHB, Veterans Affairs Canada, and Correctional Service Canada (CSC).

While the reimbursement status of most medications has improved over the past two years, it is still taking around two years or more after NOC for the provinces and territories to reimburse sight-saving medications. Two new medications for the treatment of GA were approved by the United States Food and Drug Administration (FDA) in 2023. Syfovre (pegcetacoplan) was approved by the FDA in February 2023¹⁴ and Izervay (avacincaptad pegol) was approved by the FDA in August 2023.¹⁵ As of the time of writing (July 13th, 2024), neither product has been approved by Health Canada for sale in Canada.

7.6.1 Biosimilars

As mentioned in our previous report card, there are a number of ophthalmic biosimilar products currently under development. Two of these ophthalmic biosimilar products have been approved by Health Canada for sale in Canada: Byooviz (ranibizumab biosimilar, approved March 8th, 2022) and Ranopto (ranibizumab biosimilar, approved October 11th, 2023).¹⁶

There were a number of biosimilar products approved containing bevacizumab, however the product monographs for all of these products contain the warning that these products should not be used for intravitreal injection.

8. Emerging Issues

8.1 Vision Health Workforce Projections

8.1.1 Ophthalmologists

The 2022 Report Card on Vision Health expressed concern that the number of ophthalmologists was not keeping up with the growth in the Canadian population over the age of 65. This is of particular concern since the major causes of vision loss in Canada – cataracts, glaucoma, AMD, and DR – are associated with aging. The most recent available data from CIHI¹⁷ on the size of the Canadian ophthalmologist workforce reports that there were 1,363 ophthalmologists in Canada in 2022 or 3.50 ophthalmologists per 100,000 total population. This is a slight increase over 2020 when a study by Buys and Bellan¹⁸ reported 1,323 ophthalmologists in Canada or 3.48 ophthalmologists per 100,000 total population. Of particular concern is the finding that the number of ophthalmologists per 100,000 people over the age of 65 has declined to 18.0 compared to 19.35 in 2020. Buys and Bellan also reported that the proportion of ophthalmologists over the age of 65 has been steadily increasing from 12.5% in 1968 to 20.9% in 2020. The aging ophthalmologist workforce and lack of significant growth in new ophthalmologists entering the field to keep pace with a growing and aging population will put increasing strain on the vision health care system. This may be exacerbated by the advent of new treatments for diseases not previously treated such as GA, which will also put greater demands on the shrinking number of ophthalmologists to keep up with the delivery of services.

8.1.2 Optometrists

According to the Canadian Association of Optometrists (CAO),¹⁹ there were 7,135 optometrists in Canada in 2023. This represents a 4% increase over the 6,860 reported by CIHI²⁰ in 2021. The growth in the total number of optometrists in Canada has almost kept pace with the growth of the Canadian population, which has increased by 4.8% over this period.²¹ At the same time, the number of optometrists per 100,000 population over the age of 65 has decreased slightly, declining from 97.4 per 100,000 population over 65 in 2021 to 94.3 in 2023 (**Table 9**).

The distribution of optometrists across Canada is quite uneven, with Alberta, Ontario, Quebec, and British Columbia having the highest number of optometrists per total population, and Newfoundland and Labrador, Prince Edward Island, and Manitoba having the lowest (**Table 9**). If one compares the number of optometrists per population

over the age of 65 by province, the differences are even more dramatic, with Alberta having almost three times more optometrists per 100,000 population than Newfoundland and Labrador has.

The maldistribution of optometrists also exists within provinces. Optometrists interviewed for this study reported that larger urban areas generally have greater accessibility to optometrists than rural and remote areas (see below).

Table 9. Number of optometrists by province in Canada in 2023

	Number of optometrists in province	Number of optometrists in province per 100,000 population	Number of optometrists in province per 100,000 population >65
Newfoundland and Labrador	61	11.3	46.5
Nova Scotia	157	14.8	67.2
New Brunswick	135	16.2	70.2
Prince Edward Island	21	12.1	58.3
Quebec	1,590	17.9	86.1
Ontario	2,906	18.6	101.6
Manitoba	189	13.0	77.2
Saskatchewan	194	16.0	91.8
Alberta	917	19.5	129.7
British Columbia	965	17.5	88.5
Total Canada	7,135	17.8	94.3

8.2 The Myopia Epidemic

The global increase in the prevalence of myopia was a concern prior to the pandemic. A compilation of data from 147 studies on the prevalence of myopia throughout the world,²² published in 2016, reported that the global prevalence of myopia was 22.9% in 2016 and was projected to increase to around 50% by the year 2050 with about 9.8% of the population having high myopia. The CAO estimates that myopia affects 30% of the Canadian population.²³ A study of Canadian schoolchildren published in 2017²⁴ reported a prevalence of myopia of 6% in children aged 6 to 8, increasing to 29% for children aged 11 to 13. This study, and many other studies conducted throughout the world, showed that myopia rates are lower in children who spend more time outdoors. Thus, when people were mandated to stay indoors during the pandemic, myopia prevalence increased beyond what may have been expected under normal circumstances.

Indeed, the pandemic has exacerbated the problem and new projections of myopia prevalence are being made well in excess of the “50% by 2050” rate just discussed.²⁵ A number of studies have shown that the prevalence of myopia grew substantially during the pandemic, particularly in cases where government lockdowns caused children and adults to be kept indoors. A systematic analysis of 10 papers reporting this effect²⁶ found that the progression of myopia in these combined studies was affected by the reduced time spent outdoors and by the amount of time spent looking at electronic devices such as smart phones and tablets. An online survey conducted by Leger in June 2024 on behalf of the CAO²⁷ found that Canadian adults spent an average of 7.1 hours daily on a screen, an increase from 6.4 hours prior to COVID. In this survey, parents reported that their children were currently spending an average of 3.8 hours of daily screen time, down from 4.4 hours in 2022 but up from 2.9 hours prior to COVID-19. Education programs need to be undertaken to encourage parents to wean their children away from screens and have them spend more time outdoors.

8.3 The Need for Regular Eye Examinations

All ophthalmologists and optometrists interviewed for this report (discussed below) said that the most important thing that an individual can do for their vision health is to have regular eye examinations. One of the effects of the COVID-19 pandemic has been that many patients did not see an eye doctor for the duration of the pandemic. Many of the ophthalmologists and optometrists interviewed for this study told us that they had seen patients who had lost vision due to their not having kept appointments or having regular eye examinations during this period.

While it is more important than ever that all people have their eyes examined regularly, a survey conducted by Leger²⁸ in September 2023 found that 38% of respondents were overdue for an eye exam and that 35% of respondents would only book an eye exam if they experienced vision issues. 46% of respondents said that worsening vision over time would motivate them to increase the frequency of their eye exams. Another poll conducted by Leger²⁹ in January 2023 found that 71% of Canadians expect at least one early warning symptom of glaucoma although vision loss from glaucoma can occur in the absence of symptoms. The most recent survey conducted by Leger on behalf of the CAO, mentioned above, reported that 74% of Canadian adults say they get their eyes checked at least once every two years and 45% get their children's eyes tested every year.

There is clearly a significant need to educate the public about the need for regular eye examinations and their eye health in order to allow for early detection and treatment of eye diseases that may mitigate or prevent vision loss.

8.4 Gene Therapy

The idea of treating eye diseases by modifying or replacing defective or malfunctioning genes has long been a dream of vision researchers. This dream has become a reality as several gene therapies have emerged from the laboratory into clinical trials and even approval. The first gene therapy for treatment of an eye disease, Luxturna, was approved by Health Canada in 2020. Luxturna therapy replaces a defective gene called RPE65, which is present in a very small number of people who are affected by retinitis pigmentosa or another rare condition called Leber congenital amaurosis. In the spring of 2023, all provinces in Canada agreed to fund treatment with Luxturna for Canadians who needed it³⁰ and a small number of patients (+/- 10) have been successfully treated with Luxturna in Canada.

Researchers have been exploring the use of gene therapy for the treatment of both inherited and acquired eye diseases including inherited retinal diseases, AMD, diabetic retinopathy, glaucoma, uveitis, and corneal diseases. A recent study reported that 159 gene therapy clinical trials targeting ophthalmic disorders had been initiated globally up until the end of 2022.³¹ Most trials were in early phases, but there were 18 phase 3 trials underway. It is hoped that over the next few years some of the products will be entering the Canadian market.

One challenge with gene and other innovative therapies is their inaccessibility due to high cost. However, it is important to recognize that these therapies may provide a one-time treatment with impacts spanning a lifetime.

8.5 Micro-Invasive Glaucoma Surgery and Minimally Invasive Bleb Surgery

The 2022 Report Card described the use of a group of procedures called micro-invasive glaucoma surgery (MIGS) for the treatment of mild to moderate glaucoma.³² It noted that the use of a special stent for these procedures was not being funded by any province in Canada but was available in some areas where a particular hospital had the budget to pay for the stent. Since that time a new modality has entered the market that is being affected in a similar way by sporadic funding. The new modality, called minimally invasive bleb surgery (MIBS), is used primarily for the treatment of moderate to severe glaucoma and refractory glaucoma. MIBS involves the implantation of devices into the eye that create a small channel for the drainage of aqueous from the eye, thereby reducing the intraocular pressure and the anti-glaucoma medications needed to control intraocular pressure.

Both MIGS and MIBS are available in all provinces, however, individual hospitals typically bear the responsibility for purchasing devices, with no additional government funding provided specifically for this purpose. Therefore, hospitals must find room within their global budgets to purchase MIGS/MIBS devices. As a result, patients across Canada have inequitable access to this surgical method and instead must have the traditional trabeculectomy, which is more invasive and requires more time in the operating room and additional post-operative care.

In January 2024, Health Quality Ontario, based on guidance from the Ontario Health Technology Advisory Committee, recommended publicly funding MIBS for glaucoma.³³ Despite this positive recommendation, neither MIBS nor MIGS is publicly funded by the Province of Ontario or by any other province.

The inequitable access to MIGS/MIBS in hospitals across Canada is due to a lack of a mechanism to ensure that province-wide funding is available for this type of medical device. These devices do not receive funding through the provincial formulary and as noted in the previous report, in most cases, patients are not allowed to pay out-of-pocket for the devices, and private surgical clinics cannot fund them. The fact that this situation now exists in the case of at least two ophthalmic surgical devices is concerning in that the quality of one's ophthalmic health care appears to depend on the availability of funding at one's hospital. This means that there is no universal standard of care when it comes to implantation of these medical devices.

8.6 Geographic Atrophy

Geographic atrophy (GA) is an advanced form of dry AMD that can lead to significant vision loss. It can also occur in some people with wet AMD who have been treated with anti-VEGF therapies. While there is no data on the prevalence of GA in Canada, one can project from studies in other countries to get an approximate estimate of the number of people with GA in Canada.³⁴ Rudnicka et al³⁵ estimated the prevalence of GA by age in a population of European origin. Applying these prevalence numbers across the Canadian population, we get an estimate of 140,000. Since AMD and GA are more prevalent in Caucasian populations, the overall prevalence in Canada is likely to be less than that estimated by Rudnicka, whose estimate was in a population with a higher proportion of people of Caucasian origin than are present in Canada.

It is exciting to be able to report that there are now several promising treatments emerging for this blinding eye disease for which there was no previous treatment. The first two of these treatments to come to market are pegcetacoplan (Syfovre) and avacincaptad pegol (Izervay), which were approved by the FDA in February 2023³⁶ and August 2023,³⁷ respectively. These treatments have not yet been approved for sale in Canada. Anecdotally, we have heard of patients travelling to the U.S. to receive treatment with these medications.

8.7 Artificial Intelligence

Perhaps the issue that is most likely to have the most profound impact on the future of eye health in Canada in both the short and longterm is the effect that emerging technologies driven by artificial intelligence (AI) will have on the practice of both ophthalmology and optometry. AI research has been applied to many conditions including diabetic retinopathy, AMD, glaucoma, and cataracts. As of November 2022, there were over 1,000 studies of ophthalmic applications of AI listed in PubMed.³⁸ It is far beyond the scope of this short review to outline the technology behind the various uses of AI or the full scope of its potential uses. The following is a short description of some of the main areas of vision health where AI has been demonstrated to be useful.

8.7.1 Diagnosis of Eye Diseases

AI is a tool that has been shown to be effective in the diagnosis of a wide range of ophthalmic disorders, most notably diabetic retinopathy (DR), macular degeneration, and glaucoma.³⁹ A systematic review and meta-analysis of 42 studies in which AI was used to diagnose a variety of diseases concluded that AI algorithms are highly accurate for diagnosing ophthalmic diseases.³¹ Devices are being developed for autonomous detection of DR, AMD, and glaucoma.⁴⁰ AI algorithms have been shown to be highly accurate in diagnosing glaucoma using retinal images.⁴¹ Machine learning models have been shown to accurately predict parameters for which patients are likely to develop glaucoma.⁴²

8.7.2 Screening for Diabetic Retinopathy

AI can be used to conduct screening for DR through use of portable fundus cameras or OCT (optical coherence tomography) devices.^{43,44} Use of AI in conjunction with portable fundus camera technologies also has the potential for improving access to eye care in remote or rural areas where there is limited or no access to eye doctors.

8.7.3 Prediction of Disease Progression

AI analysis of data from a contact lens-based measuring device (Triggerfish) has been shown to accurately predict which patients are likely to develop glaucoma.⁴⁵

8.7.4 Triage and Practice Management^{46,47}

The potential that AI offers for practice management in both optometry and ophthalmology is best described by the following excerpt from a discussion paper prepared by the CAO for its Optometric Leaders' Forum 2023³⁸:

"Online platforms utilizing AI can automate care where possible, identify at-risk patients, and provide the range from digital triage to higher levels of care for those patients when necessary. Online intake forms with AI chatbot functionality can efficiently complete intake tasks and direct patients in an appropriate manner towards phone calls, video calls, or scheduling in-person consultations with the most appropriate care provider. Utilizing these approaches could improve access to care, enhance care coordination, optimize telehealth initiatives, improve the patient experience, and deliver better outcomes. The platforms can also be utilized to deliver timely instruction and education before and after exams and enhance remote patient management and treatment compliance."

Large language models such as ChatGPT have been studied as a means of improving the patient experience in eye care and optimizing the delivery of care by providers.⁴⁸

8.7.5 The Role of AI in Cataracts

AI has been shown to be useful for the screening and diagnosis of cataracts and for planning cataract surgery.⁴⁹ AI has been used for automatic cataract grading and lens imaging photographs have been used to identify the presence and severity of cataract and to recommend a proper treatment plan for cataract patients.^{50,51} AI has also been shown to be effective in optimizing intraocular lens power calculation.⁵²

8.7.6 The Use of AI in Accessible Technology for People Who Are Blind or Partially-Sighted

Incorporation of AI into devices for people who are blind or living with sight loss will be a game-changer that will increase accessibility and independence.

Large language models such as ChatGPT open up a whole world of accessibility. Through text or conversation with ChatGPT, an individual can access a whole world of information almost instantaneously, a world that can include descriptions of things in the environment that one may be looking at such as well-known buildings or monuments for example.

AI has also opened up a new world where an individual can use a smart phone or glasses to look at a scene, person, object, or text and have the AI read the text or describe what the person is seeing in their environment. The most recent examples of this technology are: Be My AI⁵³; Envision Glasses⁵⁴; Ray-Ban Meta Smart Glasses⁵⁵; and Seleste Smart Glasses.⁵⁶

As this technology evolves, the level of detail and interactivity of these devices will increase significantly. Already there are new versions of these technologies undergoing beta testing. As a result of AI, the next few years will see a further dramatic improvement of accessible and wearable technology for people who are blind or partially-sighted.

8.8 Assistive Devices Programs

The technology revolution has impacted the lives of people living with vision loss to such a dramatic degree that there are now very few activities that a person who is blind or partially-sighted cannot participate in when equipped with the appropriate technology. To optimize the use of assistive devices by people who are blind or partially-sighted, it is essential that assistive devices be affordable. In February 2022, the CCB published the results of an Ontario survey⁵⁷ of people who were blind or partially-sighted regarding the functioning of the Ontario Assistive Devices Program (ADP), an invaluable resource that partially funds some of the costs associated with essential assistive devices.

While the CCB survey identified the need for reform of the ADP, it also reflected the usefulness of a program that subsidizes the cost of essential assistive devices for people who are blind or partially-sighted such as the Ontario ADP.

The need for a program such as the Ontario ADP is further borne out by the finding of the CCB survey that 33% of respondents to the survey said that they had a pre-tax household income of less than \$35,000 while 42% of respondents had a pre-tax household income of less than \$50,000. Only 33% of respondents were working either part- or full-time or were self-employed. 70% of respondents said that they would not have been able to acquire their device without ADP funding.

Principles guiding the Accessible Canada Act⁵⁸ include that “everyone must have the same opportunity to build the life they want” and that “everyone must have barrier-free access to full and equal participation in society.” To accomplish this, Canadians with vision loss must be fully rehabilitated to fully integrate into all aspects of Canadian life, and this includes having affordable access to the assistive devices they need.

The Canadian commitment to the Convention on the Rights of Persons with Disabilities⁵⁹ ensures Canada’s dedication “to promote and protect the rights of persons with disabilities in such areas as freedom of expression and opinion, respect for home and the family, education, health, employment and access to services.” In an increasingly digital society, this means ensuring affordable access to all aspects of modern life through equitable access to the assistive technologies that make such access possible.

The Preamble to the Canada Disability Benefit Act⁶⁰ recognizes that “working-age persons with disabilities are more likely to live in poverty than working-age persons without disabilities, because of economic and social exclusion,” that “the Government of Canada is committed to the economic and social inclusion of persons with disabilities, as evidenced by its introduction of the Accessible Canada Act,” and that “reducing poverty contributes to the progressive realization of Canada’s international obligations under the

United Nations Convention on the Rights of Persons with Disabilities.” Affordable access to assistive devices helps to lift Canadians with disabilities out of poverty, enabling them to pursue their lifegoals and participate more fully in all aspects of Canadian society.

For all these reasons, it is essential that all Canadian provinces and territories have an accessible devices program that helps people who are blind or partially-sighted acquire the technology that they need to fully participate in life.

In order to advocate for an assistive devices program such as Ontario’s ADP in all provinces and territories, it was felt necessary to understand what the current state of assistive device reimbursement is in all provinces and territories.

A review of all provincial programs (**Table 10**) revealed that assistive devices programs existed to some extent in some provinces (British Columbia, Alberta, Saskatchewan, Manitoba, Ontario, Quebec, Prince Edward Island, and the Northwest Territories). No programs existed in New Brunswick, Nova Scotia, Newfoundland and Labrador, the Yukon, or Nunavut. Ontario had the most comprehensive program. However, while the Ontario ADP’s mission and mandate are well-intentioned, according to its own records, the ADP processes annual funding requests from just 1% of the 466,000 people living with vision loss in Ontario, and spends a mere \$2.9 million offsetting the cost of visual aids – the aids intended to enable people with visual disabilities to increase their independence.⁶¹ Clearly, there is more that can be done to ensure that the Ontario ADP is meeting the needs of Ontarians but, even at this level, programs of this sort would make a world of difference to blind and partially-sighted Canadians in other provinces where such a program does not exist. If all Canadian provinces and territories had a similar program, one that reimbursed devices to this limited extent, the total cost to Canada would be less than \$6 million – a pittance considering the value that a program of this nature delivers and the difference that it would make to the lives of people living with vision loss.

It is therefore strongly recommended that the federal government create and mandate a national assistive devices program to offset the cost of independence-granting assistive devices for all blind and partially-sighted Canadians.

Table 10. Assistive devices programs available in Canada

Province/territory	Program (yes/no)	Program name	Program description	Eligibility	Coverage
British Columbia ⁶²	Partial	Assistive Technology Services	Limited to full/partial funding of work-related visual aids only, excludes daily living	B.C. resident with valid health card and eligible to work, 16+	Undefined
British Columbia ⁶³	Partial	Assistive Technology British Columbia	Grant/loan programs for students and institutions	B.C. resident with a certified disability, post-secondary students/institutions only	Undefined
Alberta ⁶⁴	Yes	Alberta Aids to Daily Living VLR Specialized Technical Equipment Program (STEP)	Cost-share (25% to a max of \$500/year), up to \$8,000/year	Alberta resident with valid health card, 20/70 for low-vision aids, 20/200 for assistive technology	Consumer products (no computers) and assistive technologies; see STEP Approved Product List
Saskatchewan ⁶⁵	Yes	Saskatchewan Aids to Independent Living (SAIL)	Loan/cost-share; one device per functional purpose	Saskatchewan resident with valid health card, 20/70 for low-vision aids and 20/150 for assistive technology	Loans of brailers, canes, magnifiers, and book readers. Cost-share of daily living devices, multi-function electronics, and assistive software.
Saskatchewan ⁶⁶	Partial	Employability Assistance for Persons with Disabilities (EAPD)	Assessment/job readiness, assistive technology, training	Saskatchewan residents with certified disabilities seeking employment/education that leads to employment	Undefined

Province/ territory	Program (yes/no)	Program name	Program description	Eligibility	Coverage
Manitoba ⁶⁷	Partial	Employability Assistance for People with Disabilities	Limited to employment/ education only	Manitoba resident with valid health card, certified by a medical practitioner	Limit of \$1,500 for assistive technology; braille, OCR, computers and software, CCTV, and audio readers
Ontario ⁶⁸	Yes	Assistive Devices Program (ADP)	75/25 cost-share to a maximum funded amount per device	Ontario resident with valid health card, 20/70 in best eye with correction, referred by eye care professional	3 low-vision (optical) aids, 1 mobility aid (white cane), 1 high-tech reading aid, and 1 high-tech writing aid, max funded amount/renewal time limits
Quebec ⁶⁹	Yes	RAMQ Visual Devices Program	Loan of low-tech, high-tech, and daily living devices	Quebec resident enrolled in the Quebec Health Plan, assessed for a permanent functional visual disability; covers low vision (6/21), blindness (6/120), and deaf-blindness	White canes, optical and high-tech aids, braille systems, computers and software, devices for daily living, and some medical aids. Limitations within device categories. Funding limits on all devices. Computers restricted to post-secondary students/job seekers.
New Brunswick	No	N/A	N/A	N/A	N/A

Province/ territory	Program (yes/no)	Program name	Program description	Eligibility	Coverage
Prince Edward Island ⁷⁰	Partial	AccessAbility Supports	Some assistive devices for vision	PEI resident with a valid health card, under 65 to apply (excludes seniors), certified disability by a medical practitioner	Undefined, no computers, assessment to determine funding ceiling
Nova Scotia	No	N/A	N/A	N/A	N/A
Newfoundland and Labrador	No	N/A	N/A	N/A	N/A
Yukon	No	N/A	N/A	N/A	N/A
Northwest Territories	Partial	Agreement through Vision Loss Rehabilitation Canada	Unknown	Unknown	Limited list; includes canes, braille material, low-vision aids, "desktop technologies," and cell phones
Nunavut	No	N/A	N/A	N/A	N/A
Federal government funding: Indigenous, Métis, and Inuit	Yes	Non-Insured Health Benefits (NIHB) program ^{71*} (*B.C. only: First Nations Health Authority [FNHA] Vision Care Framework, separate from NIHB) ⁷²	Indigenous peoples only, payer of last resort B.C.: Funding of low-vision devices	Resident of Canada (except B.C.), Status Indian or Inuk. 20/70 for low-vision aids or 20/200 for assistive tech. B.C.: Resident of B.C., Status Indian or Inuk.	Specifically excludes computers, printers, and cell phones. B.C.: Low-vision aids

9. Eye Health Practitioners' Perspective

Previous research has demonstrated that conversations with practitioners often provide richer, more nuanced insights into vision health than quantitative methods alone. To leverage the benefits of such an approach, 15 Canadian practitioners were interviewed qualitatively for this section. The group included a mix of ophthalmologists and optometrists from across Canada, including three optometrists who identify as Indigenous. In addition, nine optometrists provided their opinions through an online survey mechanism, which was structured around the same questions asked during interviews.

All views expressed in this section are summarized insights from the practitioners who were interviewed, and are intended to facilitate discussion and knowledge-sharing across professional and organizational boundaries. No view is representative of any profession in its entirety or of any organization, including the CCB and FBC.

The topics in this section require further analysis and research, as well as additional collaboration from the professional communities and stakeholders involved.

While each interview was distinct, five common themes emerged that reflect the broader experiences of Canada's vision professionals throughout 2023, including:

1. The continued impact of the pandemic on practices across Canada, including workforce and supply chain challenges
2. The importance of regular and accessible eye exams (alongside increased public awareness)
3. A critical need for increased funding for Canadian vision research and other programs such as telemedicine
4. The value of emerging technologies and initiatives, including AI, but only when paired closely with human practitioners
5. The need for programs and frameworks that build trust, address inequities, and increase access for Canada's Indigenous populations

These and related themes are elaborated on below, starting with ophthalmologists, followed by optometrists, and concluding with an overview of perspectives provided by Indigenous optometrists.

9.1 Ophthalmologists

9.1.1 Long-Lasting Impact of the Pandemic

Ophthalmology is a highly specialized and complex practice, with practitioners spread across a range of sub-specializations that are deeply connected to adjacent professional and clinical resources. It is not surprising that their work continues to be affected by the pandemic. For instance, most interviewees reported that the backlog in surgeries is still ongoing, with many waiting more than eight months. According to ophthalmologists, this backlog has been exacerbated by an aging population as well as staffing and supply chain challenges.

“The ripple effect of COVID is still prevalent.”

“I could work 24 hours a day, 7 days a week, and I still wouldn’t be able to keep up with demand.”

At the same time, Canadian ophthalmologists developed new resources to respond to the demands of COVID. For example, many reported an increased reliance on telehealth services and teleophthalmology – a reliance that continues to fill a crucial niche in their practices. Although the technology does not replace in-person care, it can make routine check-ups more efficient, and can increase access to care in rural and remote communities.

“Telemedicine has been absolutely essential and has allowed us to maintain our practice.”

9.1.2 Challenges Facing Professional Practice

Whether resulting from COVID or unrelated pressures, ophthalmologists reported that high patient demand was placing a strain on their practices. In some cases, they felt overwhelmed by rising patient volume, which they reported could lead to delayed care and deteriorating vision.

There was also strong consensus on the matter of workforce issues, which were described as extending beyond the complexities of the pandemic. Many professionals are now retiring, and difficulties are being experienced in hiring experienced nursing staff, thus opening a gap in service delivery.

“Staffing is a chronic problem, both during COVID and since then.”

“We need to do a better job making room for our young ophthalmologists.”

Additionally, one interviewee stressed that, in the context of increasing privatization, residents need to be able to train with experienced ophthalmologists in both public and private settings (as opposed to going directly into the private sector). According to this interviewee, “We don’t want our graduates to come out with a business mindset above all else.” One approach could be a system that ensures graduates train in a public setting before moving to private or broader frameworks that lead to collaboration and standardization across public and private settings. Although not all private centres will be interested in, for example, collaborative training models, there should be approaches to medical excellence and patient safety that are standardized across sectors.

“How do we integrate private centres into the current health context without compromising access to care and the training of our future surgeons, and in ways that maintain ethics and patient-centred care?”

Difficulties were reported in relation to referring patients as well, exacerbating this gap; for example, several ophthalmologists discussed prolonged wait times when referring patients for cataract surgery. This is further complicated by the high costs associated with private health centres, which can be the only sites to refer to when public sector specialists are unavailable. Ophthalmologists agreed that such financial barriers to necessary care are concerning.

Better and more streamlined forms of collaboration with optometry were raised as important to addressing gaps by some ophthalmologists. One interviewee emphasized the value of collaboration that avoids a “duplication of efforts and tests,” especially when they lead to increased costs for patients and governments.

9.1.3 Government and Policy Considerations

Taking into consideration some of the issues and gaps they identified, ophthalmologists were asked for their views on potential government and policy solutions. Following up on insights related to financial barriers, there was a strong consensus on the need for regulation of ophthalmic and optometric practices to prevent unnecessary out-of-pocket expenses for patients and to ensure high-quality care.

“There need to be some controls on things so that patients don’t pay out of pocket for treating disease.”

It was also widely accepted that funding for eye care needs to improve. In particular, full public funding for eye exams was deemed by specialists to be essential and the best way to prevent unnecessary vision loss and long-term complications. Ophthalmologists expressed frustration that in Canada, public coverage for eye exams is patchwork at best, covering only certain age groups and populations depending on the province. Surgical procedures and telemedicine operations were also identified as endeavours requiring increased financial support, with an emphasis placed on detaching these crucial undertakings from the vicissitudes of political cycles and quarrels.

“We need a culture of ‘everyone gets an eye exam.’”

“Everyone should have access to an eye exam.”

“We need to take health care away from this form of political football.”

Additionally, ophthalmologists agreed unanimously that financial investment into Canadian vision research is disconcertingly low, despite a wealth of Canadian expertise. Alongside this expertise, private funding is making innovation possible, but there needs to be a larger amount committed, as well as a vision-specific institute within the Canadian Institutes of Health Research (CIHR) to coordinate and fund efforts.

“The amount of funding compared to other countries in the world is pitiful.”

9.1.4 Patient Education and Eye Health

In the context of discussing eye health generally, interviewees once again stressed the importance of regular eye examinations – which were by far identified as the most important thing patients can do to maintain eye health – especially in vulnerable populations such as children and the elderly. It was also mentioned that inconsistent coverage for eye exams creates confusion, leading some patients to pay for services when they are in fact covered, or in the worst case to avoid eye exams altogether.

Universal coverage is the most obvious approach to combatting misunderstandings and increasing eye exams nationally, but ophthalmologists also underscored the importance of public awareness and education initiatives. Funded by the federal government and coordinated as part of a national vision health plan, such campaigns could promote awareness of eye health and the importance of routine screenings.

9.1.5 Innovation and Future Directions

When discussing emerging technologies, ophthalmologists expressed optimism for the use of AI for screenings, clinical trial design, and more, as well as advancements in telehealth technologies. In many cases, these innovations are already being leveraged in preliminary or nascent forms. There is a growing sense of optimism about emerging technologies and AI in ophthalmology, though these should complement rather than replace human expertise.

“There’s still a lot of things we don’t claim to screen for, and teleophthalmology doesn’t eliminate the need for a personal, face-to-face exam.”

“Ophthalmology will undoubtedly have its own ChatGPT moment.”

The notion of Canadian research was raised in this context as well, with many interviewees calling for structured research initiatives and support for Canadian vision research to advance the field. The general sense is that while technological approaches are advancing rapidly, Canadian researchers are not adequately supported to contribute fully to this expansion.

9.2 Optometrists

9.2.1 Impact of the Pandemic on Practice

Canada’s optometrists are the frontline workers of the vision health system, providing eye exams that are the primary means of detecting visual issues before they become catastrophic. As such, it is encouraging that most interviewees reported that COVID-related backlogs in service have largely resolved (or are in the process of resolving). However, it is also the case that long gaps in care during the pandemic led to a need for catch-up evaluations and, in some cases, more complex treatment. In the most extreme cases, some patients have lost vision because of these gaps.

“Wait times are tending to normalize.”

“A lot of families have skipped their annual eye exams over COVID and are slowly going back to routine.”

Increased eye issues were also discussed in relation to new habits formed during COVID – for example, increased screen time and decreased outdoor activity during COVID have led to rising issues such as myopia and dry eye. Since these issues can increase the likelihood of more severe health risks such as glaucoma, retinal detachment, and cataracts, they are being taken very seriously by Canada’s optometrists.

“Research has shown that myopia increases the risk of glaucoma, as well as retinal detachments and tears.”

9.2.2 Challenges in Practice

Unsurprisingly, COVID was also tied to challenges in running an optometric practice, with some of these difficulties extending beyond the influence of the pandemic. As with ophthalmology, staffing shortages were identified as a widespread concern, with difficulty finding qualified optometric assistants and associate optometrists willing to work in certain regions. This is especially true for Canada’s rural and remote areas, where access to care is most concerning and where socioeconomic inequity can be most pronounced. Several interviewees suggested that loan forgiveness programs could be utilized to attract new optometrists to these parts of the country.

“Loan forgiveness has been offered for some professionals, but there’s nothing like that for optometry. This could be offered in rural and remote areas to address workforce shortages.”

Supply chain issues were also mentioned as a frustration, especially in relation to drugs that can be prescribed by optometrists. It was not unusual for shortages to require unconventional sourcing solutions.

Rising costs seem to have challenged optometric practices as well: inflation and high operational costs were reported to have impacted both practice sustainability and patient affordability.

9.2.3 Eye Examination Trends

In the area of eye exams, optometrists emphasized their critical role in overall vision health and reported that awareness of their value seems to be increasing.

That said, there was consensus that education and outreach are still needed to underscore the importance of children’s eye exams, especially given the rising incidence of childhood myopia, which was discussed by every optometrist that was interviewed.

“Parents are often surprised when they find an issue because they don’t think there’s anything wrong.”

Regarding adult eye exams, optometrists commented that many adults avoid exams due to the belief that they have no vision issues; as a result, education on the importance of regular exams is essential here as well, especially on the asymptomatic nature of many diseases during their early stages (which is why routine exams are critical).

“If they think that their eyes are healthy, they are more willing to skip out on yearly eye exams.”

9.2.4 Government and Systemic Issues

Like ophthalmologists, optometrist interviewees stressed a strong need for increased public education regarding the importance of eye health and regular examinations. They agreed that regular and accessible eye exams form the heart of any “upstream” approach to vision health.

“Education is a great ROI that will prevent downstream issues, both from a health and work perspective.”

There is consensus within the professional community that regular eye exams promote preventative care, especially in rural and marginalized communities.

“Regular eye exams are the best way to prevent diseases and other visual issues in the long term.”

“Patients need to know that the check-ups should happen so that poor vision doesn’t have an impact on your life.”

“Regular eye exams often reveal underlying systemic conditions. Vision is not always affected at initial presentation.”

“Just like a car, when the human body is regularly maintained and looked after, it will last longer.”

“If they don’t have insurance, they may skip many years before coming in for an exam.”

The optometric scope of practice – what optometrists are legally allowed to do and not do – was raised by some optometrists, who expressed the opinion that expanding the scope of optometry could help reduce the backlog burden and enable better vision health coverage in rural and remote areas.

9.2.5 Role of Technology and Innovation

A positive, hopeful worldview concerning technology and innovation was common among optometrists. AI in vision health, for example, was largely seen as a promising tool for diagnosing eye diseases and assessing biomarkers. In some practices, AI tools are already being deployed. As with ophthalmologists, however, this optimistic view is coupled with the insistence that it support, not replace, human expertise.

“AI is being incorporated everywhere so I am sure it will have an impact on the vision sector as well. AI is nowhere near able to replace a doctor but may help doctors see more people and have treatment be broader geographically.”

Optometrists also reported a growth in telehealth utilization, noting that the technology became prominent during the pandemic. Interviewees saw it as a beneficial addition to practice that will continue post-COVID, but also emphasized that it has limitations, cannot replace routine in-person eye exams, and requires new regulatory frameworks to facilitate growth and optimization.

9.2.6 Optimism and Future Needs

As a general theme, optimism about the future of eye care in Canada surfaced in interviews with optometrists. While stressing the need for funding and increased access to care, interviewees also noted a growing public recognition of the importance of regular eye exams, which they found promising. Many of the interviewees also pointed toward Bill C-284 as an important legislative contribution, one that could provide the foundation for essential vision health initiatives down the road.

At the same time, the need for new regulatory frameworks emerged as a shared concept. These frameworks will help establish guidelines and standards of care for new technologies, including telehealth, and will be essential to vision health quality and patient safety going forward.

Existing programs and frameworks, including the ADP in Ontario and the NIHB program for First Nations and Inuit communities, should be enhanced and streamlined to ensure access to care. The general view is that these programs are outdated, clinging to rigid and bureaucratic systems that ultimately frustrate both patients and practitioners, blocking access to care for those who need it most.

10. Perspectives on Indigenous Eye Health

The three Indigenous optometrists who were interviewed provided insights into important aspects of Canadian vision care. Their views touched on three general topics: 1. eye health; 2. cultural complexities that affect care; and 3. government programs for Indigenous patients.

Regarding eye health, optometrists made it clear that the Indigenous patients they are seeing tend to have poorer eye health than non-Indigenous patients. The reasons for this are complex and difficult to identify – there are “a lot of social and financial factors,” according to one optometrist – but a lower frequency of eye exams appears to be a crucial driver. In general, Indigenous Canadians are not getting check-ups as regularly as non-Indigenous groups. Given all that we know about the crucial role of routine examinations, as well as the high rate of diabetes amongst Indigenous Canadians – one optometrist mentioned that 8 out of 10 of her Indigenous patients are diabetic – it is unsurprising that this could translate to poorer visual outcomes.

“About 20% of the kids I see on reservations have refractive errors that should be corrected.”

“Diabetes affects your eyes, but this is not well-known in certain communities.”

The optometrists agreed that cultural complexities play a role in this as well. Most notably, the fraught and violent history of Canada’s colonial authority has very understandably led to a generalized mistrust of the health care system.

“Indigenous folks are less likely to get their eyes checked because of the history of our health system.”

“Health care has to be equitable for it to be accepted in these communities.”

Addressing these concerns is a delicate and multifaceted undertaking, and part of the broader agenda of Canada’s Truth and Reconciliation Commission. That said, the interviewees did agree that new models of health care, especially models that include Indigenous practices and practitioners, would be a step in the right direction. As it stands, Canada’s health system is intricately tied to its history as a colonizer; a new, innovative model that allows Indigenous Canadians to provide care for one another would offer a viable alternative for many Indigenous communities.

“Indigenous groups should be able to create their own system, other than the NIHB, which is very much a colonized system.”

Government programs such as NIHB were identified as problematic by all three optometrists. While NIHB does, for instance, provide a pathway to accessing care, it is burdened by complex bureaucracy and outdated processes that create “a lot of barriers on both sides.” Both patients and practitioners are struggling to work with the program, to such a degree that an optometrist who practices with a mobile clinic found the most difficult part of the practice to be interfacing with NIHB: “Things that make doing a mobile clinic difficult have to do with NIHB.” Interviewees highlighted a model in British Columbia that allows practitioners to sidestep NIHB processes as incredibly effective and promising.

One of the additional constraints of NIHB is that it always functions as the last payer in any transaction, forcing patients and practitioners to work through layers of additional and potential coverage, including notoriously obfuscating private insurers.

“NIHB is a slow-moving train and it’s awful.”

“If NIHB isn’t working properly – and it isn’t – then maybe it has to be replaced with something more effective and culturally sensitive.”

In the context of cultural issues, historical mistrust, and the goals of the Truth and Reconciliation Commission, the optometrists felt that these issues are tied directly to access to health care and to the treaty rights that guarantee equitable treatment:

“Health care is a treaty right. There is no situation where it should be denied.”

11. Acknowledgement

The Report Card on Vision Health in Canada was commissioned by the CCB and FBC. It is with sincere gratitude that we acknowledge that this report was made possible by unconditional grants from several of Canada's leading research-based pharmaceutical companies, without whose support this important initiative could not have been accomplished.

abbvie

Apellis

 astellas



 Biogen.

Johnson&Johnson

 MacuMira



 Specsavers

12. Appreciation

The CCB and FBC would like to thank both the Canadian Association of Optometrists and the Canadian Ophthalmological Society, and express our gratitude to the ophthalmologists, optometrists, health policy researchers, key members of the vision loss and vision health population, and stakeholder organizations who generously gave of their time to provide input and be interviewed for this report.

13. Research Leads

Dr. Keith Gordon, Principal Investigator

Dr. Keith Gordon is the Senior Research Officer of the CCB. His research is dedicated to advancing advocacy for the vision loss community. Dr. Gordon was the principal investigator of five CCB studies: “A Report Card on Vision Health in Canada, Part 1 and Part 2” (October 2022); “The Impact of the COVID-19 Pandemic on Canadians Who Are Blind, Deaf-Blind, and Partially-Sighted” (April 2020); “The Cost of Vision Loss and Blindness in Canada” (March 2021); “The Impact of the COVID-19 Pandemic on Eye Health in Canada” (September 2021); and “Reforming Ontario’s Assistive Devices Program” (February 2022). He also authored the CCB report “A Needs Report on Accessible Technology” (November 2019).

Dr. Gordon is past Vice President of Research of the Canadian National Institute for the Blind (CNIB) in Toronto, where he worked from 2007 to 2017, directing all research activities of the organization. Prior to that, he spent more than 30 years in the ophthalmic industry, where he was responsible for a wide range of research and scientific activities. Dr. Gordon is past Research Director of Blind and Low Vision New Zealand and past Chair of the Board of BALANCE for Blind Adults. He’s also an adjunct professor in the Department of Ophthalmology and Vision Sciences at the University of Toronto.

Dr. Chad Andrews, Investigator

Dr. Chad Andrews is a researcher and policy analyst with a Ph.D. in cultural studies. He collaborates closely with the CCB and other organizations to advance work in several areas, including health policy, health profession regulation, research funding, support for new treatments and diagnostics, and advocacy for the vision loss community.

As a researcher, Dr. Andrews engages with stakeholders in health science and policy to analyze the physical, psychological, and socioeconomic impacts of disease and disability. Working with patients and patient groups, he has contributed to sociological and burden of illness research that studies the personal and social dimensions of vision loss, including work that is published in the *Canadian Journal of Diabetes* and the *Canadian Journal of Ophthalmology*. His research on regulatory and science policy, largely focused on applying a systems theory lens, has been featured in editorials for the Canadian Science Policy Centre.

Dr. Andrews also teaches and publishes occasionally in the interdisciplinary spaces between literature, history, and policy.

Dr. Larissa Moniz, Investigator and Project Co-Lead

Dr. Larissa Moniz joined FBC in December 2019. She has a Ph.D. in molecular and cancer biology from the University of Toronto and has continued her research in the U.K. at University College London. Dr. Moniz has worked in research and knowledge translation at a number of health charities, both in the U.K. and Canada, most recently at Prostate Cancer Canada.

At FBC, Dr. Moniz's team works to deliver on the mission of the organization, which is to fund research toward treatments to preserve and restore vision, to ensure that all Canadians have access to appropriate vision care, and to provide support and information to individuals living with vision loss.

Ian White, Investigator

Ian White became a dedicated advocate for the community of people living with vision loss after going blind as an adult.

In 2011, White began volunteering with the CNIB and took training as a group leader/peer mentor for the CNIB's New Beginnings program, co-facilitating over a dozen sessions between 2011 and the present.

Also in 2011, White co-founded the Visionaries Peer Support Group, which was chartered as a Chapter of the CCB in 2013. As Chapter President, he has overseen the Visionaries' phenomenal growth and created the Experience Expo, an annual White Cane Week event in Toronto that is Canada's only exposition and consumer show for those living with vision loss. White also encouraged the creation of several new CCB Chapters in the Toronto area.

In 2015, White assisted in forming, and co-organizes, a Toronto branch of the CCB's Get Together with Technology program, a self-directed user group for those interested in assistive technologies. He was also a founding director with East and West Learning Connections, a not-for-profit organization devoted to multicultural learning and cross-integration in Toronto.

From 2016 to 2022, White served on the CCB's Ontario Division Council, as its Acting Chair. He's also currently a member of the Ontario Assistive Devices Program Reform Working Group.

White was the recipient of the CCB Outstanding Achievement Award in 2019, was named the CCB's 2023 Person of the Year, and has been recognized by the CNIB and the Government of Ontario for his work as a volunteer.

Michael Baillargeon, Project Co-Lead

Michael Baillargeon is Senior Advisor to the CCB, managing advocacy, research, and special event initiatives, as well as government and stakeholder relations. Over the last 18 years, he has been an advisor to, and advocate for, the blind, deaf-blind, and partially-sighted community. Baillargeon has played a key role on a wide range of issues before the Council, including serving as publisher of *White Cane Magazine* and overseeing annual White Cane Week and Vision Month events, including the acclaimed Vision Health Conference Series, the annual Gathering of Stakeholders Dinner, and the Experience Expo and Forum.

Baillargeon has grown the CCB research department, conducting studies in key areas important to the vision loss community, including accessible technology and assistive devices. He was co-lead on the CCB study “The Impact of the COVID-19 Pandemic on Canadians Who Are Blind, Deaf-Blind, and Partially-Sighted,” published in April 2020, as well as “The Cost of Vision Loss and Blindness in Canada” and its COVID-19 Addendum, both of which were released by the CCB in 2021. This was followed closely by “A Report Card on Vision Health in Canada, Part 1 and Part 2,” released in October 2022. More recently, Baillargeon is in a key leadership role with stakeholder groups in reporting on, and recommending changes in, Ontario’s Assistive Devices Program.

Through advocacy and research, Baillargeon is dedicated to building public awareness and improving the well-being and quality of life of those living with vision loss. He is proud of his efforts with the CCB to dismantle barriers to accessibility, and in working with others to prevent blindness and to provide those living the experience of vision loss with the tools to change what it means to be blind.

14. Endnotes

- 1 Campbell RJ, El-Defrawy SR, et al. Public funding for private for-profit centres and access to cataract surgery by patient socioeconomic status: an Ontario population-based study. *CMAJ*. 2024 Aug 25;196(28):E965-E972. doi: 10.1503/cmaj.240414. PMID: 39187289; PMCID: PMC11349346.
- 2 CCB analysis of IQVIA Pharmastat database.
- 3 Canadian Institute for Health Information (CIHI) 2024, National Health Expenditure Trends – Series A. Available at: <https://www.cihi.ca/en/national-health-expenditure-trends#data-tables>. Accessed April 5th, 2024.
- 4 Canadian Institutes of Health Research. Funding decisions database. Available at: [Funding Decisions Database – CIHR \(cihr-irsc.gc.ca\)](https://fundingdecisions.cihr-irsc.gc.ca/). Accessed May 22nd, 2024.
- 5 Keywords used in CIHR funding search: low vision, vision loss, visual impairment, vision impairment, blindness, blindness and deafness, blind deaf disorder, blind deaf disorders, hearing and vision loss, retinal disease, retinal diseases, sensory disease, sensory disorder, ophthalmology, retina, iris, cornea, pupil, sclera, conjunctiva, macula, lens, optic nerve, fovea, eye, macular degeneration, age-related macular degeneration, glaucoma, cataract, diabetic retinopathy, diabetic macular edema, proliferative diabetic retinopathy, refractive error, strabismus, keratoconus, uveitis, presbyopia, photo receptor, photoreceptor, retinal ganglion cell, visual cortex, inherited retinal degeneration, retinitis pigmentosa, and ocular imaging.
- 6 Fighting Blindness Canada. Audited financial statements December 2022. Available at: [Audited-financial-statements-2022.pdf \(fightingblindness.ca\)](https://www.fightingblindness.ca/audited-financial-statements-2022.pdf). Accessed July 11th, 2024.
- 7 Glaucoma Research Society of Canada. Available at: [Home | Glaucoma Research Society of Canada](https://www.glaucomaresearchsociety.ca/). Accessed July 11th, 2024.
- 8 Lavastre V, Coordonnatrice scientifique. [Réseau de recherche en sciences de la vision \(RRSV\) / Vision Sciences Research Network \(VSRN\)](https://www.reseau-recherche-vision.ca/) personal communication, June 2024.
- 9 Canadian Institute for Health Information. *Wait Times for Priority Procedures in Canada – Data Tables*. Ottawa, ON: CIHI; 2024. Available at: [wait-times-priority-procedures-in-canada-2024-data-tables-en.xlsx \(live.com\)](https://www.cihi.ca/en/wait-times-priority-procedures-in-canada-2024-data-tables-en.xlsx). Accessed June 9th, 2024.
- 10 Health Canada Register of Innovative Drugs. Available at: [reg-innov-dr-eng.xlsx \(canada.ca\)](https://www.canada.ca/en/health-canada/services/drugs-health-products/register-innovative-drugs-eng.html). Accessed May 27th, 2024.
- 11 Health Canada Drug Product Database. Available at: <https://health-products.canada.ca/dpd-bdpp/info?lang=eng&code=103362>. Accessed May 27th, 2024.
- 12 Health Canada Drug Product Database. Available at: <https://dhpp.hpfb-dgpsa.ca/review-documents/resource/RDS1708351809911>. Accessed August 27th, 2024.

- 13 Provincial, territorial, NIHB, and CAC formularies. Available at:
<https://pharmacareformularysearch.gov.bc.ca/Search.xhtml>
<https://idbl.ab.bluecross.ca/idbl/load.do>
<https://formulary.drugplan.ehealthsask.ca/SearchFormulary/BG/455680>
<https://web22.gov.mb.ca/eFormulary/>
<https://www.formulary.health.gov.on.ca/formulary/>
<https://www.ramq.gouv.qc.ca/en/citizens/prescription-drug-insurance/find-out-whether-a-drug-covered>
<https://www2.gnb.ca/content/dam/gnb/Departments/h-s/pdf/en/NBDrugPlan/NewBrunswickDrugPlansFormulary.pdf>
https://www.princeedwardisland.ca/sites/default/files/publications/pei_pharmacare_formulary.pdf
<https://novascotia.ca/dhw/pharmacare/documents/formulary.pdf>
<https://www.health.gov.nl.ca/health/nlpdp/fmlsearch.asp>
https://www.gov.nu.ca/sites/default/files/gn_drug_formulary_binder_1_final_dec_2021.pdf
 NT Pharmacare Formulary | Health and Social Services (gov.nt.ca)
<https://ihs.gov.yk.ca/drugs/f?p=161:9000>
<https://nihb-ssna.express-scripts.ca/en/0205140506092019/16/160407>
<https://www.veterans.gc.ca/en/financial-support/medical-costs/treatment-benefits/poc10/search>
 Accessed May 27th, 2024.
- 14 United States Food and Drug Administration Drug Database. Available at: <https://www.accessdata.fda.gov/scripts/cder/daf/index.cfm?event=overview.process&ApplNo=217171>. Accessed July 13th, 2024.
- 15 United States Food and Drug Administration Drug Database. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/label/2023/217225s000lbl.pdf. Accessed August 27th, 2024.
- 16 Health Canada. Drug Product Database. Available at: <https://health-products.canada.ca/dpd-bdpp/dispatch-repartition>.
- 17 Canadian Institute for Health Information. *Supply, Distribution and Migration of Physicians in Canada, 2022 – Data Tables*. Ottawa, ON: CIHI; 2023. Available at: [supply-distribution-migration-physicians-in-canada-2022-data-tables-en.xlsx](https://www.cihi.ca/en/supply-distribution-migration-physicians-in-canada-2022-data-tables-en.xlsx) (live.com). Accessed June 14th, 2024.
- 18 Buys YM, Bellan L. Updated inventory and projections for Canada’s ophthalmology workforce. *Can J Ophthalmol*. 2023 Dec;58(6):523-531. doi: 10.1016/j.jcjo.2022.06.008. Epub 2022 Jul 1. PMID: 35780860.
- 19 Couillard F. Canadian Association of Optometrists. Personal communication. August 28th, 2024.

- 20 Canadian Institute for Health Information. *Health Workforce in Canada, 2017 to 2021: Overview – Data Tables*. Ottawa, ON: CIHI; 2022. Available at: [health-workforce-canada-2017-2021-overview-data-tables-en.xlsx \(live.com\)](https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=2.1&cubeTimeFrame.startYear=2021&cubeTimeFrame.endYear=2023&referencePeriods=20210101%2C20230101). Accessed June 14th, 2024.
- 21 Statistics Canada. Population estimates on July 1st, by age and gender. Available at: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1710000501&pickMembers%5B0%5D=1.1&pickMembers%5B1%5D=2.1&cubeTimeFrame.startYear=2021&cubeTimeFrame.endYear=2023&referencePeriods=20210101%2C20230101>. Accessed August 29th, 2024.
- 22 Holden BA, Fricke TR, et al. Global Prevalence of Myopia and High Myopia and Temporal Trends from 2000 through 2050. *Ophthalmology*. 2016 May;123(5):1036-42. doi: 10.1016/j.ophtha.2016.01.006. Epub 2016 Feb 11. PMID: 26875007.
- 23 Myopia. Canadian Association of Optometrists. November 2023. Available at: <https://opto.ca/eye-health-library/myopia-nearsightedness>. Accessed June 18th, 2024.
- 24 Yang M et al. 'Myopia presence in Canadian schoolchildren: a pilot study.' *Eye* (2017). doi:10.1038/s41433-018-0015-5.
- 25 Dolgin E. A myopia epidemic is sweeping the globe. Here's how to stop it. *Nature*. 2024 May;629(8014):989-991. doi: 10.1038/d41586-024-01518-2. PMID: 38811708.
- 26 Cyril Kurupp AR, Raju A, et al. The Impact of the COVID-19 Pandemic on Myopia Progression in Children: A Systematic Review. *Cureus*. 2022 Aug 26;14(8):e28444. doi: 10.7759/cureus.28444. PMID: 36176879; PMCID: PMC9512310.
- 27 Canadian Association of Optometrists. Press release. August 26, 2024. Available at: [CAO Survey_Press Release_202400826.pdf \(opto.ca\)](https://www.opto.ca/press-releases/cao-survey-press-release-202400826.pdf). Accessed August 29th, 2024.
- 28 Specsavers Canadian Eye Exam Frequency Survey. 2023. Conducted by Leger.
- 29 Specsavers Glaucoma Awareness Survey. 2023. Conducted by Leger.
- 30 Fighting Blindness Canada. Canadians now have access to Luxturna. April 2023. Available at: <https://www.fightingblindness.ca/news/canadians-access-luxturna/>. Accessed July 16th, 2024.
- 31 Ameri H, Kesavamoorthy N, Bruce DN. Frequency and Pattern of Worldwide Ocular Gene Therapy Clinical Trials up to 2022. *Biomedicines*. 2023 Nov 23;11(12):3124. doi: 10.3390/biomedicines11123124. PMID: 38137345; PMCID: PMC10740821.
- 32 Gordon KD. A Report Card on Vision Health in Canada. Part 1. The Impact of the COVID-19 Pandemic on Vision Health in Canada 2021. Micro-invasive glaucoma surgery. p33-34. Available at: <https://ccbnational.net/shaggy/wp-content/uploads/2023/07/15-Report-Card-on-Vision-Health-in-Canada-2021-Part-1-English-Oct-14-2022.pdf>. Accessed July 16th, 2024.
- 33 Health Quality Ontario. Minimally invasive bleb surgery for glaucoma. January 2024. Available at: <https://www.hqontario.ca/Evidence-to-Improve-Care/Health-Technology-Assessment/Reviews-And-Recommendations/Minimally-Invasive-Bleb-Surgery-for-Glaucoma>. Accessed July 16th, 2024.

- 34 Vujosevic S, Alovisi C, Chakravarthy U. Epidemiology of geographic atrophy and its precursor features of intermediate age-related macular degeneration. *Acta Ophthalmol.* 2023 Dec;101(8):839-856. doi: 10.1111/aos.15767. PMID: 37933608.
- 35 Rudnicka, A.R., Jarrar, Z., et al. (2012) Age and gender variations in age-related macular degeneration prevalence in populations of European ancestry: a meta-analysis. *Ophthalmology*, 119, 571–580.
- 36 United States Food and Drug Administration. Letter of approval. February 2023. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/applletter/2023/217171Orig1s000ltr.pdf. Accessed July 24th, 2024.
- 37 United States Food and Drug Administration. Letter of approval. August 2023. Available at: https://www.accessdata.fda.gov/drugsatfda_docs/applletter/2023/217225Orig1s000ltr.pdf. Accessed August 27th, 2024.
- 38 Taribagil P, Jeffry Hogg HD et al. Integrating artificial intelligence into an ophthalmologist’s workflow: obstacles and opportunities. *Expert Review of Ophthalmology.* 2023; 18(1): 45-56doi.org/10.1080/17469899.2023.2175672.
- 39 Bulloch G, Seth I, et al. Artificial Intelligence Applications and Performance Metrics in Ophthalmology: A Systematic Review and Meta-Analysis. *Ann Ophthalmol Vis Sci.* 2023; 6(1): 1037.
- 40 Bhaskaranand M, Ramachandra C, et al. The Value of Automated Diabetic Retinopathy Screening with the EyeArt System: A Study of More Than 100,000 Consecutive Encounters from People with Diabetes. *Diabetes Technol Ther.* 2019 Nov;21(11):635-643. doi: 10.1089/dia.2019.0164. Epub 2019 Aug 7. PMID: 31335200; PMCID: PMC6812728.
- 41 Chaurasia AK, Greatbatch CJ, Hewitt AW. Diagnostic Accuracy of Artificial Intelligence in Glaucoma Screening and Clinical Practice. *J Glaucoma.* 2022 May 1;31(5):285-299. doi: 10.1097/IJG.0000000000002015. Epub 2022 Mar 18. PMID: 35302538.
- 42 Jammal AA, Thompson AC, et al. Human versus machine: Comparing a deep learning algorithm to human gradings for detecting glaucoma on fundus photographs. *Am J Ophthalmol* 2020;211:12331.
- 43 Srivastava O, Tennant M, et al. Artificial intelligence and machine learning in ophthalmology: A review. *Indian J Ophthalmol* 2023;71:11-7.
- 44 Grzybowski A, Brona P, et al. Artificial intelligence for diabetic retinopathy screening: A review. *Eye* 2020;34:45160.
- 45 Martin KR, Mansouri K, et al Research Consortium. Use of Machine Learning on Contact Lens Sensor-Derived Parameters for the Diagnosis of Primary Open-angle Glaucoma. *Am J Ophthalmol.* 2018 Oct;194:46-53. doi: 10.1016/j.ajo.2018.07.005. Epub 2018 Jul 25. PMID: 30053471.
- 46 Canadian Association of Optometrists. Teleoptometry and Artificial Intelligence. Opportunities and Challenges for the Profession. A Discussion Paper for OLF 2023. Available at: <https://opto.ca/sites/default/files/resources/documents/OLF%202023%20Discussion%20Paper.pdf>. Accessed July 22nd, 2024.

- 47 Canadian Association of Optometrists. Optometric Leaders Forum. Summary report. 2024. Available at: https://opto.ca/sites/default/files/2024-04/2024_OLFSummaryReport.pdf. Accessed June 23rd, 2024.
- 48 Betzler BK, Chen H, et al. Large language models and their impact in ophthalmology. *Lancet Digit Health*. 2023 Dec;5(12):e917-e924. doi: 10.1016/S2589-7500(23)00201-7. PMID: 38000875; PMCID: PMC11003328.
- 49 Gutierrez L, Lim JS, et al. Application of artificial intelligence in cataract management: current and future directions. *Eye Vis (Lond)*. 2022 Jan 7;9(1):3. doi: 10.1186/s40662-021-00273-z.
- 50 Xu X, Zhang L, et al. A hybrid global-local representation CNN model for automatic cataract grading. *IEEE J Biomed Health Inf*. 2020;24(2):556–567.
- 51 Son KY, Ko J, Kim E, Lee SY, Kim MJ, Han J, Shin E, Chung TY, Lim DH. Deep Learning-Based Cataract Detection and Grading from Slit-Lamp and Retro-Illumination Photographs: Model Development and Validation Study. *Ophthalmol Sci*. 2022 Mar 18;2(2):100147. doi: 10.1016/j.xops.2022.100147. PMID: 36249697; PMCID: PMC9559082.
- 52 Sramka M, Slovak M, Tuckova J, Stodulka P. Improving clinical refractive results of cataract surgery by machine learning. *PeerJ*. 2019;7:e7202.
- 53 The Blind Life. Be My AI. YouTube video. Available at: <https://www.youtube.com/watch?v=lkJEM5UvQ6c>. Accessed July 24th, 2024.
- 54 The Blind Life. Envision Glasses update. YouTube video. Available at: [The Envision Glasses Just Got Better!! Now With ChatGPT And AI! BIG UPDATES!! - YouTube](#). Accessed July 24th, 2024.
- 55 Sag A, Moor Insights and Strategies. Research Note: Ray-Ban Meta Smart Glasses Review. Available at: <https://moorinsightsstrategy.com/research-notes/ray-ban-meta-smart-glasses-review-better-cooler-and-more-useful-than-ever/>. Accessed July 24th, 2024.
- 56 Seleste Smart Glasses. Available at: [Seleste Smart Glasses | Seleste](#). Accessed July 24th, 2024.
- 57 Gordon KD and Vision Loss ADP Reform Working Group. Survey Report. Reforming Ontario's Assistive Devices Program. February 2022. Available at: [14-ADP-Report-2-21-22-PDF-NA.pdf \(ccbnational.net\)](#). Accessed July 19th, 2024.
- 58 Canadian Human Rights Commission. Overview of the Accessible Canada Act. Available at: <https://www.accessibilitychrc.ca/en/overview-accessible-canada-act#principle>. Accessed July 31st, 2024.
- 59 Canadian Library of Parliament. The United Nations Convention on the Rights of Persons with Disabilities: An Overview. Available at: https://lop.parl.ca/sites/PublicWebsite/default/en_CA/ResearchPublications/201309E#:~:text=Canada%20and%20183%20other%20states,contributions%20of%20people%20with%20disabilities. Accessed July 31st, 2024.
- 60 Government of Canada. Justice Laws Website. Canada Disability Benefit. Available at: [Canada Disability Benefit Act \(justice.gc.ca\)](#). Accessed July 31st, 2024.

- 61 Government of Ontario. Assistive Devices Program. Policies and procedures manual. Page 10. Available at: <https://files.ontario.ca/moh-adp-policies-and-procedures-manual-assistive-devices-program-2023-07-01.pdf>. Accessed July 13th, 2024.
- 62 Work BC. Assistive Technology Services. Available at: [Assistive Technology Services | WorkBC](#). Accessed July 19th, 2024.
- 63 Assistive Technology British Columbia. Available at: [Assistive Technology BC | Our Services \(at-bc.ca\)](#). Accessed July 19th, 2024.
- 64 Vision Loss Rehabilitation Alberta. Specialized Technical Equipment Program (STEP). Available at: [Alberta Aids to Daily Living CNIB STEP Program Manual](#). Accessed July 19th, 2024.
- 65 Government of Saskatchewan. Saskatchewan Aids to Independent Living. Available at: [Saskatchewan Aids to Independent Living | Health Services for People with Disabilities | Government of Saskatchewan](#). Accessed July 19th, 2024.
- 66 Government of Saskatchewan. Employability Assistance for Persons with Disabilities. Available at: [Employability Assistance for Persons with Disabilities | Job Training and Financial Support Programs | Government of Saskatchewan](#). Accessed July 19th, 2024.
- 67 Government of Manitoba. Employability Assistance for People with Disabilities. Available at: [Province of Manitoba | wd - Employability Assistance for People with Disabilities \(gov.mb.ca\)](#). Accessed July 19th, 2024.
- 68 Government of Ontario. Assistive Devices Program. Available at: [Visual aids | ontario.ca](#). Accessed July 19th, 2024.
- 69 Government of Québec. RAMQ Visual Devices Program. Available at: [Visual aids | Régie de l'assurance maladie du Québec \(RAMQ\) \(gouv.qc.ca\)](#). Accessed July 19th, 2024.
- 70 Government of Prince Edward Island. AccessAbility Supports Program. Available at: [AccessAbility Supports | Government of Prince Edward Island](#). Accessed July 19th, 2024.
- 71 Government of Canada. Non-Insured Health Benefits Program. Available at: [10.0 Low vision equipment and supplies benefits list \(sac-isc.gc.ca\)](#). Accessed July 19th, 2024.
- 72 First Nations Health Authority. Medical supplies and equipment benefit. Available at: <https://www.fnha.ca/benefits/medical-supplies-and-equipment>. Accessed July 19th, 2024.



Aussi disponible en français.