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Research

Frequency and source of prescription eyewear insurance coverage in Ontario: a repeated population-based cross-sectional study using survey data

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Abstract

Background: Insurance coverage may reduce cost barriers to obtain vision correction. Our aim was to determine the frequency and source of prescription eyewear insurance to understand how Canadians finance optical correction.

Methods: We conducted a repeated population-based cross-sectional study using 2003, 2005 and 2013–2014 Canadian Community Health Survey data from respondents aged 12 years or older from Ontario, Canada. In this group, the cost of prescription eyewear is not covered by the government unless one is registered with a social assistance program or belongs to a specific population. We determined the frequency and source of insurance coverage for prescription eyewear in proportions. We used survey weights provided by Statistics Canada in all analyses to account for sample selection, a complex survey, and adjustments for seasonal effect, poststratification, nonresponse and calibration. We compared unadjusted proportions and adjusted prevalence ratios (PRs) of having insurance.

Results: Insurance covered all or part of the costs of prescription eyewear for 62% of Ontarians in all 3 survey years. Of those insured, 84.1%–86.0% had employer-sponsored coverage, 9.0%–10.3% had government-sponsored coverage, and 5.7%–6.8% had private plans. Employer-sponsored coverage remained constant for those in households with postsecondary graduation but decreased significantly for those in households with less than secondary school graduation, from 67.0% (95% confidence interval [CI] 63.2%–70.8%) (n = 175 000) in 2005 to 54.6% (95% CI 50.1%–59.2%) (n = 123 500) in 2013–2014. Government-sponsored coverage increased significantly for those in households with less than secondary school graduation, from 29.2% (95% CI 25.5%–32.9%) (n = 76 400) in 2005 to 41.7% (95% CI 37.2%–46.1%) (n = 93 900) in 2013–2014. In 2013–2014, Ontarians in households with less than secondary school graduation were less likely than those with secondary school graduation to report employer-sponsored coverage (adjusted PR 0.79, 95% CI 0.75–0.84) but were more likely to have government-sponsored coverage (adjusted PR 1.27, 95% CI 1.06–1.53).

Interpretation: Sixty-two percent of Ontarians had prescription eyewear insurance in 2003, 2005 and 2013–2014; the largest source of insurance was employers, primarily covering those with higher education levels, whereas government-sponsored insurance increased significantly among those with lower education levels. Further research is needed to elucidate barriers to obtaining prescription eyewear and the degree to which affordability impairs access to vision correction.

An estimated 57% of Canadians aged 20 years or older (16.8 million people in 2019[1]) have some form of vision problem requiring optical correction;[2] the proportion among Canadians aged 50 or older is 80%.[2] In the United States, clinically important refractive errors similarly affect over half of Americans.[3] An appropriate pair of eyeglasses is a simple means to correct vision problems caused by refractive errors. However, the affordability of eyeglasses and contact lenses, referred to as prescription eyewear, is a major public health concern.[4–7] In Canada, the cost of a pair of prescription eyeglasses may be prohibitive, ranging from $240 to $1000 in retail stores.[8]

Competing interests: Sherif El-Defrawy reports research grant support from Alcon, outside the submitted work. Ya-Ping Jin reports research grant support from the Lindenfield Family Research Grant for this study, and from the Glaucoma Research Society of Canada and the Kensington Eye Institute, outside the submitted work. Yvonne Buys reports consulting fees from Allergan and Bausch & Lomb, outside the submitted work. No other competing interests were declared.

This article has been peer reviewed.

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***CMAJ Open* 2021. DOI:10.9778/cmajo.20200104**

Uncorrected and undercorrected refractive errors are the primary causes of visual impairment worldwide.[9–14] Robinson and colleagues[15] reported that 71.8% of cases of visual impairment among Ontarians aged 40 or older are amenable to refractive correction. Aljied and colleagues[16] found that 64%–80% of cases of visual impairment among Canadians aged 45 or older are due to refractive error. Similar findings have been reported from the US and Australia.[17–19]

In Canada, the cost of prescription eyewear is not covered by provincial health insurance plans. Most Canadians must pay out of pocket or use an insurance plan to obtain optical correction. We previously reported that about 55% of Canadians in 2003 had insurance that covered all or part of the cost of prescription eyewear.[20] However, the source from which Canadians obtain their prescription eyewear insurance and changes in coverage in recent years are unknown. We performed a study to determine the frequency and source of insurance coverage for prescription eyewear in Ontario and the time trend from 2003 to 2013–2014 to better comprehend how people finance these vision aids. Our data may assist public policy experts in the quest to eradicate avoidable visual impairment and associated medicosocial consequences.[21–24]

Methods

Setting and design

We conducted a repeated population-based cross-sectional study using survey data from Ontario, Canada, where the cost of prescription eyewear is not covered by the government unless one is registered with a social assistance program (e.g., Ontario Works, Ontario Disability Support Program,[25,26] Non-Insured Health Benefits program) or belongs to a specific population (e.g., veterans, refugees, First Nations and Inuit[27–30]).

Data source and participants

The Canadian Community Health Survey is a nationwide, cross-sectional, self-report telephone survey covering 98% of Canadians aged 12 years or older living in private dwellings.[31] Survey participants are selected at random by Statistics Canada.[31–33] The present study is an analysis of Ontario respondents from the 2003, 2005 and 2013–2014 Canadian Community Health Surveys. We selected this population because Ontario was the only province to participate in the optional module on prescription eyewear insurance in all 3 survey years.

Outcome measures

Our study outcome measures were the frequency and source of prescription eyewear coverage. We ascertained this information from the Canadian Community Health Survey question "Now, turning to your insurance coverage. Please include any private, government or employer-paid plans." Following this opening statement, participants were asked, "Do you have insurance that covers all or part of the costs of eyeglasses or contact lenses?"[34–36] Those who responded "Yes" in the 2005 and 2013–2014 surveys were further asked: "Is it (1) a government-sponsored plan? (2) an employer-sponsored plan? and/or (3) a private plan?"[34,35] No question on source of insurance was asked in the 2003 survey.

Other measures

Participants responded to questions regarding their age, sex, ethnoracial background, immigration status, marital status, highest level of education in the household and total annual household income. Highest level of education in the household was categorized by Statistics Canada into 4 groups: less than secondary school graduation; secondary school graduation, no postsecondary; some postsecondary education; and postsecondary certificate or diploma, or university degree.[35,37] We consolidated data on total household income into 3 approximately equal groups: below middle level (< $40 000), middle level ($40 000–$79 999 in 2003 and 2005, and $40 000–$89 999 in 2013–2014) and above middle level (≥ $80 000 in 2003 and 2005, and ≥ $90 000 in 2013–2014).[34–36]

Statistical analysis

We determined the frequency and source of prescription eyewear insurance coverage. We calculated the frequency of coverage as the proportion of respondents who reported having insurance among all respondents. We computed the proportion of source of insurance as the proportion of respondents who reported having employer-sponsored (or government-sponsored or private plan) coverage among all respondents who reported having insurance. We examined factors associated with having insurance coverage with prevalence ratios (PRs) derived from the log-Poisson regression model with robust variance estimation.[38,39] The odds ratio from the logistic regression model was not used because the occurrence of the studied outcomes was quite common (> 30%). We excluded invalid responses (i.e., "Don't know," "Refusal" and "Not stated") to questions analyzed from our analyses. We used survey weights provided by Statistics Canada in all analyses to account for sample selection, a complex survey, and adjustments for seasonal effect, poststratification, nonresponse and calibration.[31–33] Weighted data are more representative of the survey population and are required by Statistics Canada for reporting when producing population estimates.[31–33] We constructed 95% confidence intervals (CIs) using bootstrap weights provided by Statistics Canada.

Ethics approval

Informed consent was obtained by Statistics Canada from all study participants. The analysis of Statistics Canada data for this study was approved by the University of Toronto Health Sciences Research Ethics Board.

Results

The unweighted number of Canadian Community Health Survey respondents in Ontario was 42 777 in 2003, 41 766 in 2005 and 42 553 in 2013–2014, representing response rates of 91.4%, 92.2% and 86.4%, respectively.[31–33] One respondent (0.002%) in 2005 and 5 respondents (0.01%) in 2013–2014 reported having prescription eyewear coverage from

Table 1: Weighted frequency and prevalence of insurance coverage for prescription eyewear among Ontarians aged 12 years or older in 2003, 2005 and 2013–2014 stratified by sociodemographic characteristics

Characteristic	2003		2005		2013–2014	
	Frequency (*n*, 100's)	Prevalence (95% CI), %	Frequency (*n*, 100's)	Prevalence (95% CI), %	Frequency (*n*, 100's)	Prevalence (95% CI), %
Total	62 155	62.3 (61.5–63.0)	61 846	62.1 (61.3–62.8)	68 694	62.0 (61.1–62.9)
Age, yr						
12–19	7936	69.2 (67.3–71.1)	8106	67.6 (65.7–69.6)	7887	67.4 (65.2–69.6)
20–39	20 982	62.0 (60.6–63.4)	19 933	61.7 (60.4–63.0)	20 729	60.5 (58.8–62.1)
40–64	27 598	68.7 (67.6–69.9)	28 209	68.9 (67.7–70.1)	32 367	70.7 (69.2–72.1)
65–74	3585	42.8 (40.8–44.9)	3437	40.9 (38.9–42.9)	5013	44.5 (42.5–46.5)
≥ 75	2054	34.2 (32.1–36.3)	2161	36.2 (33.8–38.6)	2697	34.9 (32.9–36.8)
Sex*						
Female	31 452	61.7 (60.7–62.8)	30 909	60.9 (59.8–61.9)	34 727	61.3 (60.0–62.5)
Male	30 703	62.8 (61.7–63.9)	30 937	63.3 (62.3–64.3)	33 967	62.8 (61.4–64.1)
Highest education level in household						
Less than secondary school graduation	3151	43.2 (41.0–45.5)	2630	42.5 (40.1–45.0)	2273	37.4 (34.6–40.2)
Secondary school graduation	7192	57.9 (56.0–59.8)	5493	55.9 (53.8–57.9)	6939	53.0 (50.5–55.4)
Some postsecondary	3441	60.5 (57.4–63.7)	2852	58.9 (55.3–62.5)	1995	57.6 (52.3–62.9)
Postsecondary school graduation	46 137	65.7 (64.8–66.6)	46 516	65.6 (64.7–66.5)	55 656	66.1 [65.1–67.1)
Marital status						
Married/common-law	39 382	66.0 (65.1–66.9)	39 179	65.8 (64.8–66.8)	42 938	67.2 (66.1–68.3)
Widowed	1779	36.3 (33.9–38.6)	1714	36.3 (33.8–38.8)	1830	36.1 (33.6–38.6)
Separated/divorced	3526	56.9 (54.4–59.5)	3480	57.0 (54.3–59.6)	4490	54.5 (51.1–57.8)
Single/never married	17 432	60.2 (58.7–61.7)	17 458	59.8 (58.5–61.1)	19 233	57.9 (56.2–59.5)
Household income†						
Below middle level	9285	41.6 (40.2–43.0)	8229	38.7 (37.3–40.1)	9682	38.2 (36.4–40.0)
Middle level	20 878	65.6 (64.4–66.9)	19 785	64.2 (64.2–62.8]	25 889	60.8 (59.3–62.2)
Above middle level	24 888	77.7 (76.5–78.9)	28 165	77.9 (76.8–79.0)	33 123	77.3 [76.1–78.5)
Ethnic background‡						
White	50 286	64.7 (63.9–65.4)	49 700	64.4 (63.6–65.1)	51 085	64.4 (63.6–65.3)
Non-White	9579	52.2 (50.0–54.4)	10 805	53.1 (50.9–55.3)	15 140	54.3 (52.0–56.6)
Aboriginal	689	72.4 (67.1–77.6)	1109	67.6 (53.1–72.0)	2015	71.7 (67.8–75.7)
Immigrant status§						
Nonimmigrant	45 682	67.1 (66.3–67.8)	45 926	66.3 (65.6–67.1)	49 039	66.7 (65.8–67.6)
Immigrant						
Within previous 9 yr	3056	41.7 (38.1–45.2)	3581	45.4 (41.8–49.0)	3499	43.6 (39.1–48.0)
10 yr or longer	11 762	54.8 (53.0–56.5)	12 173	55.3 (53.4–57.3)	15 187	55.0 (52.9–57.1)

Note: CI = confidence interval.
*Self-reported as female or male.
†Less than middle level = less than $40 000; middle level = $40 000–$79 999 in 2003 and 2005, $40 000–$89 999 in 2013–2014; above middle level = $80 000 or more in 2003 and 2005, $90 000 or more in 2013–2014.
‡White: self-identification as White; non-White: self-identification with a group other than White or Aboriginal; Aboriginal: self-identification as First Nations (Status or non-Status), Métis or Inuk (Inuit).
§Nonimmigrant: born in Canada; immigrant: not born in Canada.

3 sources (employer-sponsored, government-sponsored and private plan). These rare cases were included in our analyses of source of insurance. Between 3% and 5% (n = 1137–2162) of respondents in the surveys did not have a valid answer to the question on prescription eyewear insurance and were excluded from our analyses.

Overall, 62% of Ontarians aged 12 or older were covered in part or in full for the costs of prescription eyewear in all 3 study years (Table 1). Of the 11.1 million people in this age group in the province in 2013–2014, 4.2 million (38%) had no insurance coverage. Coverage was higher among those aged 12–19 and those aged 40–64, and was lower among those aged 65–74 and those aged 75 or older (Table 1). In 2013–2014, coverage among Ontarians aged 75 or older was about half of the coverage among those aged 40–64 (34.9% v. 70.7%).

Insurance coverage increased in parallel with increasing education level and increasing household income (Table 1). In terms of marital status, coverage was lowest for those who were widowed (36.1% in 2013–2014, less than half the coverage among those who were married or in a common-law relationship, 67.2%). In terms of ethnicity, Aboriginal Ontarians had the highest coverage (71.7% in 2013–2014), followed by those who self-identified as White (64.4% in 2013–2014). Immigrants had significantly lower insurance coverage than nonimmigrants; this was true even for those who had lived in Canada for 10 years or longer (Table 1).

Source of funding

In 2005 and 2013–14, the main source of funding among Ontarians with prescription eyewear coverage was employers (84.1% and 86.1%, respectively), followed by government subsidies (9.0% and 10.3%, respectively) and private plans (5.7% and 6.8%, respectively) (Figure 1). Data for 2003 were unavailable.

In both years, among Ontarians with coverage, 87.0% of those in households with postsecondary education had employer-sponsored plans (Figure 2A). The proportion with employer-sponsored coverage decreased significantly between 2005 and 2013–2014 for those in households with less than secondary school graduation, from 67.0% (95% CI 63.2%–70.8%) (n = 175 000) to 54.6% (95% CI 50.1%–59.2%) (n = 123 500) (Figure 2A). It also decreased significantly for those with a total household income below middle level, from 63.5% (95% CI 61.2%–65.8%) to 53.1% (95% CI 50.1%–56.0%) (Figure 2B).

The rate of government-sponsored coverage increased significantly between 2005 and 2013–2014 among Ontarians in households with less than secondary school graduation, from 29.2% (95% CI 25.5%–32.9%) (n = 76 400) to 41.7% (95% CI 37.2%–46.1%) (n = 93 900) (Figure 3A). Government-sponsored coverage also increased significantly among those with a household income below middle level, from 29.7% (95% CI 27.5%–31.8%) to 38.4% (95% CI 35.4%–41.1%) (Figure 3B).

After adjustment for the confounding effects of age, sex, household income, marital status, immigrant status and ethnoracial background, Ontarians in households with less than secondary school graduation were significantly less likely than those with secondary school graduation to have employer-sponsored insurance (adjusted PR 0.79, 95% CI 0.75–0.84) but were more likely to have government-sponsored insurance (adjusted PR 1.27, 95% CI 1.06–1.53) in 2013–2014 (Table 2). Missing values for adjusted covariates ranged from 0 (for age and sex) to 1508 (for ethnicity).

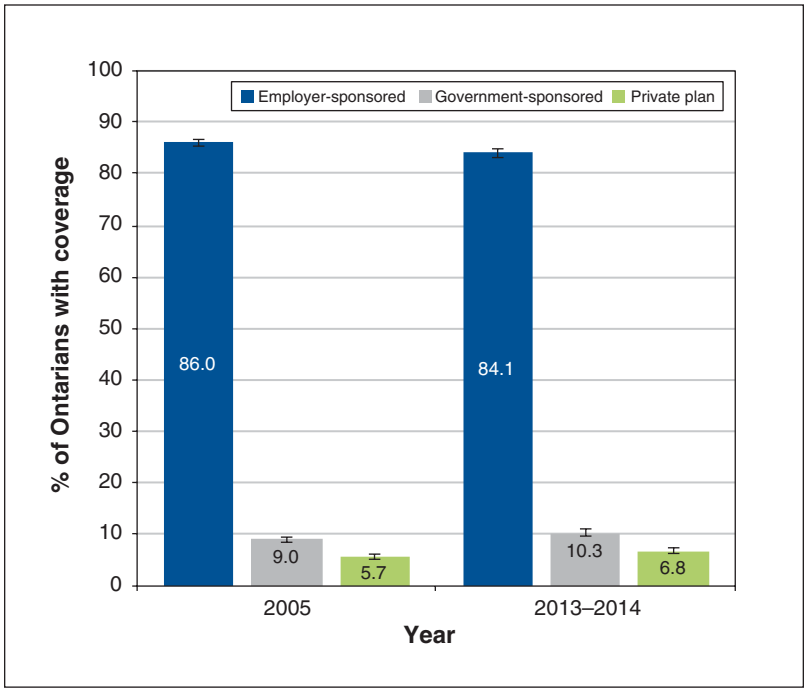

Figure 1: Proportion of Ontarians with prescription eyewear coverage in 2005 and 2013–2014, by source of funding. Data for 2003 were unavailable. Error bars represent 95% confidence intervals.

Interpretation

We found that 62% of Ontarians aged 12 years or older had prescription eyewear insurance in 2003, 2005 and 2013–2014. The largest source of insurance was employers, followed by government subsidies and private plans. Employer-sponsored insurance coverage primarily covered people in households with postsecondary school graduation. It was significantly lower in 2013–2014 than in 2005 among those in households with less than secondary school graduation. In contrast, the rate of government coverage increased significantly among people in households with less than secondary school graduation over the study period. This trend may be partly due to updated and more inclusive financial eligibility criteria.[8,40] In 2013–2014, more than 4 million Ontarians had no prescription eyewear insurance at all, which

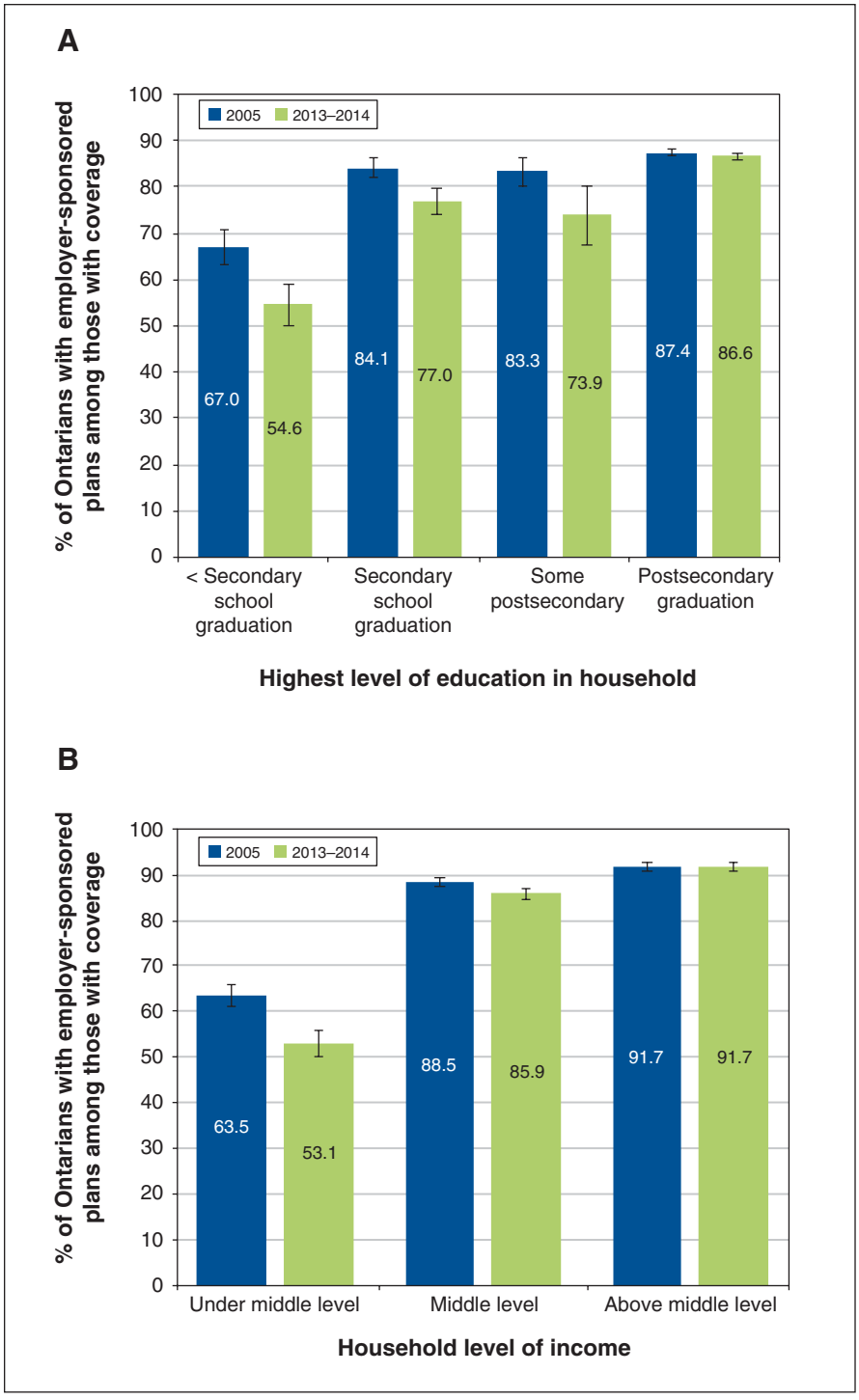

Figure 2: Proportion of Ontarians with prescription eyewear coverage who had employer-sponsored plans in 2005 and 2013–2014, by the highest level of education attained in the household (A) and total household income (B). Data for 2003 were unavailable. Error bars represent 95% confidence intervals.

made them potentially vulnerable to cost barriers associated with the purchase of eyewear.

Our finding of decreased employer-sponsored coverage over time is in agreement with the report of Chan and colleagues,[41] who found that employer-sponsored health insurance, including coverage for eyewear, among retirees in Ontario declined between 2005 and 2013–2014. Using self-reported data from the US National Health Interview Survey, Varadaraj and colleagues[6] reported that, in 2008–2016, 15%–20% of Americans aged 18 or older had vision insurance (coverage for routine eye examinations, prescription lenses and frames) obtained through employment or via government programs such as Medicaid, or purchased directly. This rate is much lower than the 62% of Ontarians who were covered by an insurance plan in the present study. However, differences in survey questions ("[Do you have] a single service plan for vision care?" in the US study v. "Do you have insurance that covers all or part of the costs of eyeglasses or contact lenses?" in our study), the age group studied (≥ 18 yr in the US study v. ≥ 12 yr in our study) and US national versus Ontario provincial coverage make it difficult to comment on the disparity. Li and colleagues[42] studied adults aged 40–64 years using Behavioural Risk Factor Surveillance System Vision Module data and found that 59.4% of Americans in 8 states had vision insurance in 2008, compared to 59.5% of working-age Canadians nationwide in 2003[20] and 68.9% in Ontario in 2005 in the present study. Accordingly, coverage among those of working age seems to be similar in Canada and the US. We are not aware of prior studies reporting on the source of prescription eyewear insurance.

Although a small proportion (11% in 2013–2014 in the current study) of people who have no insurance coverage for prescription eyewear may be able to afford it given their higher household income, the majority may face challenges related to cost. An inability to pay for the eye examination, lenses and frames may pose major barriers to obtaining needed vision correction, particularly among those with lower education levels, older adults, those who are widowed and immigrants.[43–45] This is a paradox given that a previous study showed that these groups need eyeglasses the most.[2] An eye examination is the necessary first step to prescription correction. In a previous study, the proportion of Ontarians who indicated cost as a reason

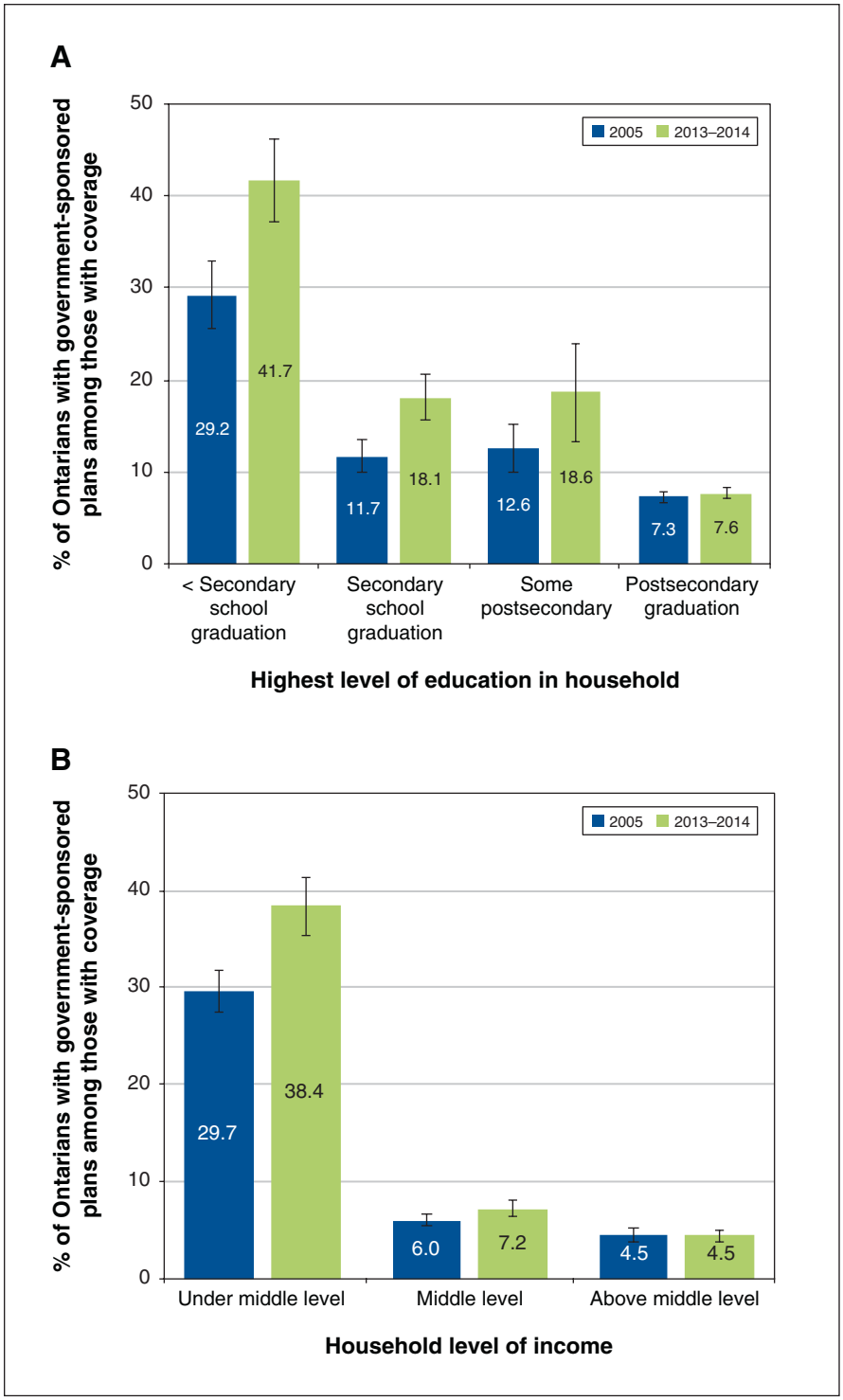

Figure 3: Proportion of Ontarians with prescription eyewear coverage who had government-sponsored plans in 2005 and 2013–2014, by the highest level of education attained in the household (A) and total household income (B). Data for 2003 were unavailable. Error bars represent 95% confidence intervals.

for not having eye examinations was greater among those aged 20–64 who did not have government-insured eye examinations than among those aged less than 20 years or 65 or older with government coverage.[2] This shows that the cost of an eye examination is the first hurdle on the path to obtaining prescription eyewear.[46]

Many large corporations find that the burden of providing health insurance for their workers seriously affects their ability to compete globally.[47] Some smaller companies have eliminated their health insurance entirely or require greater contributions from the insured worker.[47,48] Currently, financial deficits in health care budgets exist in almost every Canadian province; expanding employer-sponsored or government-sponsored prescription eyewear coverage therefore seems unlikely to occur. However, maintaining the current funding model will mean that 38% of Ontarians will remain uninsured, perpetuating cost barriers for those with visual impairment and impeding many Canadians from obtaining needed vision correction. We therefore call for politicians, policy-makers, governments and researchers to develop innovative solutions to help remedy the widespread need for optical correction.

Limitations

Study limitations include the use of self-reported data, which may be affected by recall and social desirability biases. Using collateral information such as social assistance data to validate self-reported government-sponsored coverage for prescription eyewear is challenging.[40,49,50] Second, given the Canadian Community Health Survey sampling design, our findings apply only to Ontarians living in private dwellings, that is, a rented or owned property.[20] Third, owing to survey question changes by Statistics Canada, the 2013–2014 survey is the last one with data on prescription eyewear insurance from Ontario, which made it difficult to examine coverage after this period. Last, the Canadian Community Health Survey did not elicit information on refractive surgery, the amount of coverage for prescription eyewear, whether copayments are required when using an insurance plan, or whether affordability or the lack of insurance was a perceived barrier to obtaining optical correction. We were therefore unable to address these issues.

Table 2: Adjusted prevalence ratio (weighted) of having employer-sponsored and government-sponsored insurance among Ontarians in 2013–2014*

Variable	Adjusted PR (95% CI)	
	Employer-sponsored insurance†	Government-sponsored insurance‡
Age, yr		
12–19 v. 40–64	1.31 (1.13–1.52)	0.67 (0.63–0.72)
20–39 v. 40–64	0.95 (0.91–0.99)	0.72 (0.66–0.77)
65–74 v. 40–64	0.59 (0.57–0.61)	0.85 (0.68–1.05)
≥ 75 v. 40–64	0.47 (0.39–0.56)	1.02 (0.72–1.45)
Male v. female sex	0.98 (0.93–1.03)	1.00 (0.97–1.04)
Highest level of education in household		
Less than secondary school graduation v. secondary school graduation	0.79 (0.75–0.84)	1.27 (1.06–1.53)
Some postsecondary school v. secondary school graduation	1.05 (0.95–1.16)	1.23 (0.96–1.57)
Postsecondary school graduation v. secondary school graduation	1.12 (1.08–1.16)	0.84 (0.67–1.05)
Marital status		
Widowed v. married/common-law	0.88 (0.72–1.07)	0.82 (0.77–0.87)
Separated/divorced v. married/common-law	0.86 (0.76–0.97)	1.21 (1.10–1.32)
Single/never married v. married/common-law	0.70 (0.60–0.81)	1.60 (1.30–1.96)
Household income		
Below middle level v. above middle level	0.37 (0.35–0.40)	3.64 (3.37–3.93)
Middle level v. above middle level	0.82 (0.78–0.85)	1.25 (1.06–1.47)
Ethnic background		
Non-White v. White	0.95 (0.87–1.04)	0.78 (0.58–1.06)
Aboriginal v. White	0.91 (0.83–0.99)	3.26 (2.81–3.79)
Immigrant v. nonimmigrant	0.87 (0.86–0.89)	0.69 (0.64–0.74)

Note: CI = confidence interval, PR = prevalence ratio.
*All variables in the table were included in the regression model. Therefore, except for the variable being examined, all other variables were adjusted for.
†Coverage provided by employers, unions, trade associations or student organizations, which usually have group policy numbers by which insured people in the affiliated organization can be identified. The unweighted sample sizes were 19 085 (insured) and 35 056 (total).
‡Government subsidies provided to those registered with specific programs (e.g., Ontario Works, Ontario Disability Support Program, Non-Insured Health Benefits program) or who identify with specific populations (e.g., veterans, refugees, First Nations, Inuit). The unweighted sample sizes were 3203 (insured) and 19 174 (total).

Conclusion

We found that 38% of Ontarians aged 12 years or older between 2003 and 2013–2014 did not have insurance coverage for prescription eyewear and may thus be vulnerable to cost barriers associated with obtaining prescription eyewear. Among those insured, employers were the largest source of insurance, primarily covering people in households with postsecondary school graduation, whereas government subsidies were primarily provided to people in households with less than secondary school graduation. Further research is needed to elucidate barriers to obtaining prescription eyewear and the degree to which affordability impairs access to vision correction.

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Funding: This research was supported by funds to the Canadian Research Data Centre Network from the Social Sciences and Humanities Research Council, the Canadian Institutes of Health Research, the Canadian Foundation for Innovation and Statistics Canada.

Data sharing: Access to this third-party data set is through the Statistics Canada Research Data Centres (RDCs) Program, which has centres at universities across Canada. Research Data Centres are operated under the provisions of the Canadian *Statistics Act*, which states that persons retained under contract to perform special services under this act are deemed to be persons employed under this act while performing those services, in accordance with all the confidentiality rules. Anyone may apply to access the data by submitting a research proposal that justifies the need for access to confidential microdata to address a question that has relevance for the Canadian population. On approval, researchers undergo

a deeming process, and a contract is granted. Thus, access to the data is granted on a need-to-know basis. For those interested in obtaining access to these data sets, detailed contact information and application processes to gain access and guidelines to use RDC data can be found at https://www.statcan.gc.ca/eng/rdc/process.

Acknowledgements: The authors acknowledge that the data used in this publication are from Statistics Canada's Ontario components of the 2003, 2005 and 2013–2014 Canadian Community Health Surveys. They thank all participants of these surveys and the Statistics Canada staff who assisted in the survey data collection and management.

Prior presentation: The study abstract was presented at the Canadian Ophthalmological Society annual meeting, June 13–16, 2019, Québec City, Que., the Association for Research in Vision & Ophthalmology annual meeting, Apr. 28–May 2, 2019, Vancouver, BC, the University of Toronto Department of Ophthalmology and Vision Sciences 61st Research Day, May 24, 2019, Toronto, Ont., and the University of Toronto Institute of Medical Science Summer Undergraduate Research Program 50th Annual Research Day, Aug. 15, 2018, Toronto.

Disclaimer: The opinions expressed do not represent the views of Statistics Canada or the Canadian Research Data Centre Network.

Supplemental information: For reviewer comments and the original submission of this manuscript, please see www.cmajopen.ca/content/9/1/E224/suppl/DC1.