Health Insurance Coverage and Use of Eye Care Services

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Objective: To compare realized access or use of eye care services in adults with self-reported vision problems in Canada and the United States.

Methods: Using the Joint Canada/United States Survey of Health, we examined the differences in use of eye care services in 2018 Canadian respondents and 2930 Americans with self-reported vision problems. We performed multivariate logistic regression analyses to estimate the probability that individuals with vision problems and various insurance categories would visit an eye care professional.

Results: Approximately 8.2% of Americans with self-reported vision problems did not have health insurance. Americans without health insurance had the lowest age-adjusted rate of use of eye care services (42%) compared with Americans with private health insurance (67%) or public health insurance (55%) and Canadians (56%). The difference in use of eye care services between Americans without health insurance and Canadians narrowed when adjusted for income level and was almost eliminated when adjusted for having optional vision insurance. Individuals with optional vision insurance and those with higher income levels were more likely to use eye care services.

Conclusions: Americans with vision problems who had health insurance accessed eye care services at a rate higher than or equal to that of their Canadian counterparts. The gap in access between Canadians and Americans without health insurance narrowed after adjustments for income level and optional vision insurance.

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MILLIONS OF PERSONS IN the United States experience vision loss as a result of age-related eye diseases or uncorrected refractive error, and this vision loss results in considerable economic burden to the US economy. Furthermore, there is substantial disparity in realized or actual access to eye care services in the United States. Lack of awareness about the importance of regular eye care and associated health education issues contributes to lack of timely treatment of eye diseases; however, in findings consistent with those of previous studies, a recently released report based on responses to a Behavior Risk Factor Surveillance System (BRFSS) vision module suggests that cost and lack of insurance also contribute to the failure of Americans to seek eye care.

Canada’s burden because of vision problems and difficulty ensuring that residents have actual access to regular eye care services and corrective lenses are comparable with those in the United States. Although Canada and the United States share an open border and are similar in many ways, their health care financing systems differ substantially. Unlike the United States, Canada has a national health program composed of 13 interlocking provincial and territorial health insurance plans to ensure that all residents have reasonable access to medically necessary hospital and physician services, whereas the United States has no universal national health program, and approximately 45 million Americans lack general health insurance. In both Canada and the United States, general health insurance covers medical payment for eye injury and various eye diseases such as cataract, glaucoma, and diabetic retinopathy, and optional vision insurance provides additional insurance coverage for eye examinations, contact lenses, and eyeglasses and/or frames, and, in some instances, part of the costs for elective laser surgery for vision correction. Many Americans and Canadians have publicly funded or private coverage for optional vision care. In the United States, even though optional vision insurance is usually available in addition to general health insurance, some individuals without general health insurance purchase optional vision insurance.
To our knowledge, our study provides the first comparison of rates of use of eye care services in Canada and the United States in adults (age, ≥18 years) with self-reported vision problems. It also examines whether income level and insurance status (general health insurance and/or optional vision insurance) are associated with use of eye care services.

METHODS

We analyzed data from the Joint Canada/United States Survey of Health (JCUSH), a 1-time random-digit-dialing telephone survey conducted from November 4, 2002, through March 31, 2003, among civilian noninstitutionalized adults. The sample consisted of 3505 Canadians and 5183 Americans and was representative of approximately 24 million Canadian adults living in 10 Canadian provinces and 206 million civilian noninstitutionalized American adults residing in all 50 states and the District of Columbia. After a knowledgeable member of each household participating in JCUSH provided basic demographic information for all residents in the household, an adult household member was randomly selected for a more in-depth interview. The survey was designed to produce reliable national estimates of health variables stratified by sex and age group (18-44, 45-64, and ≥65 years). Poststratification was done to ensure that the final weights sum to the population census estimates. The overall response rates were 65.5% for Canada and 50.2% for the United States. Because the JCUSH questionnaire used in Canada was identical to that used in the United States except for slight differences in questions pertaining to race/ethnicity, the data collected in the 2 countries were fully comparable. The JCUSH survey has been widely used to compare health status and access to health care in Canadians vs Americans.

We classified respondents as having vision problems if they reported problems seeing at a distance (eg, recognizing a friend across the street) or up close (eg, reading a newspaper) regardless of whether they reported that their vision problems were corrected by lenses. Use of eye care services was measured by the respondents’ self-report of having visited an eye care professional in the previous 12 months. Respondents in both countries were classified as lacking optional vision insurance if they answered no to the question, “Do you have insurance that covers all or part of . . . the costs of eyeglasses or contact lenses?”

The surveys in Canada and the United States used separate sets of questions to determine respondents’ race/ethnicity. We collapsed US race/ethnicity categories into non-Hispanic white and other, and Canadian race/ethnicity categories into white and other. We grouped respondents’ general health insurance coverage into the following 4 categories: US–private insurance (American respondents who had private health insurance with or without public health insurance); US–public insurance (American respondents who had only public health insurance, including Medicare, Medicaid, Indian Health Service insurance, military insurance, or other public or government insurance); US–no insurance (American respondents who reported having no general health insurance coverage); and Canada (all Canadian respondents with or without private supplementary coverage; all had government-provided universal health insurance). We adjusted the household income of each respondent for household size (using the common method of dividing the income by the square root of the number of persons residing in the household) and divided respondents into quintile groups on the basis of their adjusted income.

We grouped respondents’ self-reported overall health into the following 3 categories: poor or fair, good, and very good or excellent. We classified them as having mobility limitation if they found any of the 3 activities related to mobility (walking a quarter of a mile, standing for 2 hours, and climbing 10 steps without resting) to be “a little difficult,” “somewhat difficult,” “very difficult,” or “cannot do.” Because an annual eye examination including dilation of the pupil is recommended for persons with diabetes mellitus, we also controlled for respondents’ diabetes status in our models. Respondents were considered to have diabetes if they reported a health care provider’s diagnosis of diabetes (excluding gestational diabetes). Data were unavailable for us to control for glaucoma and other eye conditions. Other independent variables included sex, marital status, and educational achievement (ie, less than high school, high school, more than high school).

We used commercially available software (SAS version 9.1; SAS Institute, Inc, Cary, North Carolina; and SUDAAN version 9.0; Research Triangle Institute, Research Triangle Park, North Carolina) to adjust for the sample design, nonresponses, and the probability of selection. Age-adjusted percentages were calculated by the direct standardization method based on weights from the projected 2000 standard US population. We used Wald χ² tests to explore the bivariate relationships. After controlling for other independent variables, we used multivariate logistic regression analyses to estimate the probability of individuals in various insurance groups visiting an eye care professional. We used multiple models, controlling for different sets of potential confounders, to explore the separate and combined effects of income and optional vision insurance on use of eye care services in individuals with various types of general health insurance. Interactions between health insurance, income level, and optional vision insurance were also modeled. We used Taylor linearization to estimate predictive margins and their 95% confidence intervals (CIs) from logistic regression models.

RESULTS

The study sample consisted of 2018 Canadians representing 13 million adults with vision problems and 2930 Americans representing 108 million adults with vision problems (Table 1). The vision problems in approximately 97% of study participants were corrected by use of eyeglasses or contact lenses, and those in approximately 3% were not. All Canadian subjects had publicly funded universal health insurance for medical services, and some may also have had supplementary private coverage, whereas 74.7% of American subjects had private health insurance, 17.1% had public health insurance, and 8.2% had no general health insurance coverage. Adults with vision problems in the United States reported being less healthy than their Canadian counterparts, with higher rates of diabetes, poor or fair health status, and mobility limitation.

Americans with no health insurance were much younger than those with private health insurance, whereas those with public health insurance were much older (Table 1). Income and educational achievement of Americans with public health insurance or no health insurance were similar but tended to be higher in Americans with private health insurance. In general, Americans with public health insurance and those with no health insurance were more likely to report having poor or fair health than were Americans with private health insurance or Canadians. Furthermore, Americans with public health insurance were more likely to report having diabetes or mo-
bility limitations than were Americans with private health insurance or no health insurance or Canadians. Inasmuch as more than half of Americans with public health insurance were 65 years or older, lower self-reported health status in this group should not be surprising.

Among adults with vision problems, 62.3% (95% CI, 60.3-64.3) of Americans reported having seen an eye care professional in the previous 12 months compared with 55.0% (95% CI, 52.5-57.4) of Canadians. Privately insured Americans had a higher age-adjusted rate of use of eye care services (67%) than did other Americans or Canadians (Figure 1). Age-adjusted rates of service among publicly insured Americans and Canadians were similar (55% vs 56%), and Americans with no health insurance had the lowest rate (42%). Only 4% of Americans without health insurance reported having optional vision insurance, compared with 58% of Americans with private health insurance. 44% of Americans with public health insurance, and 54% of Canadians (Figure 2).

After controlling for age, sex, and race/ethnicity, we found that Americans with no health insurance were less likely than Canadians to use eye care services (P = .007; model1) (Table 2). However, this difference narrowed after we adjusted for income (models III and V) and was almost eliminated after we adjusted for optional vision insurance (models IV and V). Even after controlling for all available factors (model V), we found that the probability of using eye care services was higher among Americans with private health insurance than among other

Table 1. Characteristics of the Study Population With Vision Problems by Type of Health Insurancea

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total Population (n=2930)</th>
<th>Population With Private Health Insurance (n=2128)</th>
<th>Population With Public Health Insurance (n=556)</th>
<th>Population With No Health Insurance (n=209)</th>
<th>Universal Health Insurance (n=2018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
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<tr>
<td>18-44</td>
<td>33.0 (31.9-35.0)</td>
<td>33.4 (31.1-35.8)</td>
<td>22.9 (18.7-27.7)</td>
<td>51.9 (44.3-59.4)</td>
<td>30.7 (28.4-33.1)</td>
</tr>
<tr>
<td>45-64</td>
<td>43.1 (41.4-45.2)</td>
<td>47.0 (44.7-49.4)</td>
<td>25.7 (21.4-30.1)</td>
<td>43.7 (36.4-51.4)</td>
<td>45.3 (42.9-47.8)</td>
</tr>
<tr>
<td>≥65</td>
<td>23.9 (22.4-25.5)</td>
<td>19.6 (18.0-21.3)</td>
<td>51.5 (46.7-56.2)</td>
<td>4.2 (2.4-7.9)</td>
<td>23.9 (22.1-25.9)</td>
</tr>
<tr>
<td>Female sex</td>
<td>56.5 (54.6-58.7)</td>
<td>55.4 (52.9-57.8)</td>
<td>59.8 (55.0-64.4)</td>
<td>58.8 (51.0-66.1)</td>
<td>56.4 (53.9-58.9)</td>
</tr>
<tr>
<td>Married</td>
<td>65.1 (63.1-67.0)</td>
<td>70.7 (68.7-72.7)</td>
<td>50.8 (46.0-55.6)</td>
<td>44.1 (36.6-52.0)</td>
<td>66.8 (64.5-69.0)</td>
</tr>
<tr>
<td>White</td>
<td>74.6 (72.6-76.5)</td>
<td>78.8 (76.8-80.9)</td>
<td>64.8 (59.9-69.5)</td>
<td>56.3 (48.4-63.9)</td>
<td>84.2 (82.2-86.0)</td>
</tr>
<tr>
<td>Educational achievement</td>
<td></td>
<td></td>
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<tr>
<td>Less than high school</td>
<td>11.7 (10.5-13.1)</td>
<td>6.2 (5.2-7.4)</td>
<td>28.3 (24.3-32.7)</td>
<td>27.8 (21.0-35.7)</td>
<td>24.4 (22.4-26.5)</td>
</tr>
<tr>
<td>School</td>
<td>36.4 (34.5-38.5)</td>
<td>34.6 (32.4-37.0)</td>
<td>41.0 (36.3-45.9)</td>
<td>43.1 (35.7-50.8)</td>
<td>27.8 (25.6-30.2)</td>
</tr>
<tr>
<td>More than high school</td>
<td>51.8 (49.8-53.9)</td>
<td>59.2 (56.8-61.5)</td>
<td>30.7 (26.4-35.3)</td>
<td>29.1 (22.8-36.4)</td>
<td>47.8 (45.3-50.3)</td>
</tr>
<tr>
<td>Annual household income</td>
<td></td>
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<tr>
<td>Lowest quintile</td>
<td>20.0 (18.2-22.0)</td>
<td>21.9 (20.0-23.0)</td>
<td>55.9 (50.1-61.5)</td>
<td>44.3 (36.1-52.9)</td>
<td>22.6 (20.5-24.7)</td>
</tr>
<tr>
<td>Lower-middle quintile</td>
<td>20.9 (19.1-23.0)</td>
<td>20.1 (18.0-22.4)</td>
<td>20.5 (16.4-25.3)</td>
<td>29.8 (22.6-38.1)</td>
<td>20.1 (18.1-22.3)</td>
</tr>
<tr>
<td>Middle quintile</td>
<td>18.3 (16.5-20.2)</td>
<td>20.7 (18.6-22.9)</td>
<td>10.2 (7.1-14.4)</td>
<td>11.4 (7.1-17.8)</td>
<td>18.0 (16.0-20.2)</td>
</tr>
<tr>
<td>Upper-middle quintile</td>
<td>21.2 (19.4-23.2)</td>
<td>25.3 (23.0-27.7)</td>
<td>7.5 (4.9-11.4)</td>
<td>9.4 (5.3-16.0)</td>
<td>20.2 (18.1-22.5)</td>
</tr>
<tr>
<td>Highest quintile</td>
<td>19.5 (17.8-21.4)</td>
<td>23.8 (21.6-26.2)</td>
<td>5.9 (3.6-9.6)</td>
<td>5.1 (2.6-9.8)</td>
<td>19.1 (17.0-21.4)</td>
</tr>
<tr>
<td>Self-rated health status</td>
<td></td>
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</tr>
<tr>
<td>Poor or fair</td>
<td>19.0 (17.5-20.7)</td>
<td>13.7 (12.1-15.4)</td>
<td>38.6 (34.2-43.3)</td>
<td>24.7 (18.7-31.9)</td>
<td>15.5 (13.9-17.2)</td>
</tr>
<tr>
<td>Good</td>
<td>26.7 (24.9-28.5)</td>
<td>25.6 (23.8-27.8)</td>
<td>29.5 (24.3-33.0)</td>
<td>33.0 (26.2-40.5)</td>
<td>30.0 (27.9-32.3)</td>
</tr>
<tr>
<td>Very good or excellent</td>
<td>54.3 (52.5-56.3)</td>
<td>60.7 (58.4-63.0)</td>
<td>32.8 (28.5-37.5)</td>
<td>42.2 (35.0-50.1)</td>
<td>54.5 (52.9-56.9)</td>
</tr>
<tr>
<td>Mobility limitation</td>
<td>34.1 (32.2-36.1)</td>
<td>28.7 (26.8-30.9)</td>
<td>58.5 (53.7-63.2)</td>
<td>31.9 (25.3-39.5)</td>
<td>30.7 (28.6-32.9)</td>
</tr>
<tr>
<td>Diabetes</td>
<td>10.1 (9.0-11.4)</td>
<td>8.4 (7.1-9.9)</td>
<td>18.4 (15.1-22.3)</td>
<td>8.9 (5.2-14.8)</td>
<td>7.1 (6.0-8.4)</td>
</tr>
</tbody>
</table>

Figure 1. Use of eye care services among adults with vision problems by type of health insurance according to the 2002-2003 Joint Canada/United States Survey of Health. Age-adjusted percentages were calculated using the projected 2000 US standard population. US-Private represents American respondents who had private health insurance with or without public insurance; US-Public, American respondents who had only public health insurance including Medicare, Medicaid, Indian Health Service insurance, military insurance, or other public or government insurance; US-None, American respondents who had no health insurance; and Canada, all respondents had government-provided health insurance. Error bars indicate 95% confidence intervals.

Americans or Canadians. After controlling for all other factors, including general health insurance, we also found that individuals with optional vision insurance were more likely than those without such insurance to use eye care services (66% [95% CI, 63-69] vs 56% [95% CI, 53-59])
that the association between not having optional vision insurance and the rate of use of eye care services between individuals with and without optional vision insurance was greater among Americans with health insurance than among Canadians.

After controlling for confounders, we found that the percentage of individuals using eye care services was lowest among those in the lowest income quintile and highest among those in the highest income quintile (Table 3). Furthermore, after controlling for other factors, we found that the association between not having optional vision insurance and using fewer eye care services was most obvious among individuals in the lowest income group (P < .001; model VII). However, we were unable to find a statistically significant association between educational achievement and use of eye care services.

Although Canada and the United States have many characteristics in common, we found that among adults with vision problems, the adjusted rate of use of eye care services was higher among Americans with private health insurance than among their Canadian counterparts. However, we also found that Americans with no health insurance were less likely than Canadians to have optional vision insurance, which was independently associated with accessing eye care services. The difference in the rate of use of eye care services between Canadians and Americans without health insurance was lower after we adjusted for income level and having optional vision insurance.

Previous studies have shown that having health insurance is positively associated with access to eye care services and that Canadians and Americans with health insurance use general medical services at about the same rate but that Americans without health insurance are less likely to visit a physician and have significantly higher unmet health care needs. However, we found that use of eye care services among adults with vision problems differed not only by general health insurance coverage but also by optional vision insurance coverage. Americans with private health insurance were most likely to have visited an eye care professional in the previous 12 months. Although Americans with public health insurance are much older and have poorer health status than Canadians, we estimated that they access eye care services at about the same rate (55% vs 56%). We also found that optional vision insurance is independently associated with use of eye care services regardless of type of general health insurance. If we assume that Americans without health insurance had similar income distribution and vision insurance distribution as Canadians did, the estimated probability of use of eye care services by the 2 groups would be close.

Results of a previous study showed that the percentages of individuals receiving recommended services for cancer prevention, diabetes management, and cardiovascular risk reduction are lower among those who lack health insurance than among those who have health insurance, even among adults with higher income levels. We found that income level was positively associated with use of eye care services regardless of health insurance status. We did not find an interaction between income level and general health insurance. However, the difference in rates of use of eye care services between individuals with and without optional vision insurance was highest in the lowest income group, and more than 44% of Americans with vision problems without health insurance are in the lowest income quintile. Moreover, results of a previous study showed that approximately 5 million Americans at high risk for serious vision loss cannot afford eyeglasses. This suggests that poor Americans without health insurance need special attention to ensure that they receive appropriate eye care.

Because only 3% of respondents in our sample had uncorrected vision problems, our findings are probably most generalizable to those who would self-report having vision problems corrected by eyeglasses or contact lenses. However, a recent study from the National Eye Institute showed that many individuals who have corrective lenses may still have correctable visual impairment due to refractive error and need to visit their eye care providers (ophthalmologists or optometrists). Many of them may also have eye conditions in the early stages of development that could eventually cause vision loss. However, as a previous study has found, the effect of health insurance and income on the likelihood of individuals receiving eye care is more crucial for those with severe vision disorders (eg, individuals with diabetes mellitus).

Between 2000 and 2004, the number of persons in the United States without health insurance increased by about 6 million, primarily because of a decline in the number of persons with employer-sponsored insurance, and two-thirds of the increased number of Americans without health insurance is projected to result from a decline in employer-sponsored insurance.

Figure 2. Adults with vision problems who lack optional vision insurance by type of health insurance coverage according to the 2002-2003 Joint Canada/United States Survey of Health. Age-adjusted percentages were calculated using the projected 2000 US standard population. US-Private represents American respondents who had private health insurance with or without public insurance coverage; US-Public, American respondents who had only public health insurance including Medicare, Medicaid, Indian Health Service insurance, military insurance, or other public or government insurance; US-None, American respondents who had no health insurance; and Canada, all respondents had government-provided health insurance. Error bars indicate 95% confidence intervals.

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health insurance had income levels below 200% of the
federal poverty level. Among adults with vision prob-
lems, a public health gap exists in actual access to eye
care services between Canada and the United States, pri-
marily owing to the population without health insur-
ance in the United States. However, although health in-
surance is associated with increased use of preventive
services and recommended treatments, simply provid-
ing health insurance to all persons may be insufficient
to increase the percentage of individuals who use eye care
services or to improve vision-related outcomes; eco-
nomic status and optional vision insurance are also sig-
ificantly associated with rates of use of eye care ser-
vices. A recent survey found that patients in the United
States are more likely to have gone without care because
of cost and to have high out-of-pocket costs compared
with patients in other countries including Canada.23 In
addition, results of a study from Australia showed that
despite universal insurance coverage, nearly half of pa-
tients with diabetes did not visit eye care professionals
for screening or follow-up of diabetic retinopathy.24 Other
issues that have a significant effect on the likelihood of
individuals accessing eye care services include lack of
awareness about vision and eye health,25 and difficulty or inconve-
nience associated with getting an eye examination (eg, wait-
ing time and transportation).7,26 Among Americans
without health insurance, those aged 40 to 64 years and,
therefore, not generally eligible for Medicare, are at risk
for age-related eye diseases that may lead to serious vi-
sion loss. Studies have shown that providing health in-
surance to near-elderly uninsured individuals may greatly
improve their health outcomes and that the cost would
be offset by a reduction in future Medicare costs.27,28 There-
fore, public health interventions targeting adults with vi-
sion problems without health insurance might be more
beneficial if they focused on those at risk for serious vi-
sion loss, especially those in the lowest income group.

Our study has several limitations. First, because JCUSH
interviewed only community-dwelling adults, it excluded
adults residing in prisons, nursing homes, and health care
institutions and those in the armed forces. Second, the re-
sponse rate to JCUSH was relatively low compared with
that of other national surveys, and suboptimal response rates
may affect the generalizability of the results. Third, be-
cause JCUSH surveyed only households with landline tele-
phones, our results do not reflect the experience of per-
sons without landline telephones, who may have had

Table 2. Predictive Margin of Using Eye Care Services in the Previous 12 Months by Type of Health Insurance Among Adults
With Vision Problems

<table>
<thead>
<tr>
<th>Model</th>
<th>Private Health Insurance</th>
<th>Public Health Insurance</th>
<th>No Health Insurance</th>
<th>Universal Health Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>I: age, sex, and race/ethnicity</td>
<td>66.3 (64.0-68.5)</td>
<td>52.8 (47.7-58.0)</td>
<td>43.8 (36.1-51.6)</td>
<td>55.2 (52.7-57.7)</td>
</tr>
<tr>
<td>II: model I plus marital status, educational achievement level, self-rated health status, mobility limitation, and diabetes</td>
<td>65.6 (63.3-67.9)</td>
<td>53.8 (48.5-59.0)</td>
<td>46.8 (39.1-54.6)</td>
<td>56.8 (54.2-59.4)</td>
</tr>
<tr>
<td>III: model II plus income level</td>
<td>65.2 (62.6-67.8)</td>
<td>51.6 (45.3-57.9)</td>
<td>48.6 (40.1-57.2)</td>
<td>57.1 (54.3-59.9)</td>
</tr>
<tr>
<td>IV: model II plus optional vision insurance</td>
<td>65.2 (62.9-67.6)</td>
<td>54.3 (49.1-59.5)</td>
<td>53.1 (45.1-61.1)</td>
<td>56.2 (53.6-58.8)</td>
</tr>
<tr>
<td>V: model II plus income level and optional vision insurance</td>
<td>64.8 (62.2-67.5)</td>
<td>52.5 (46.2-58.8)</td>
<td>54.0 (45.2-62.7)</td>
<td>56.3 (53.5-59.1)</td>
</tr>
<tr>
<td>VI: model V plus health insurance × optional vision insurance With optional vision insurance</td>
<td>69.0 (65.6-72.5)</td>
<td>65.7 (56.2-75.2)</td>
<td>NA</td>
<td>59.3 (55.6-63.0)</td>
</tr>
<tr>
<td>Without optional vision insurance</td>
<td>60.7 (56.7-64.6)</td>
<td>42.5 (34.7-50.2)</td>
<td>48.9 (40.2-57.6)</td>
<td>53.7 (49.6-57.8)</td>
</tr>
</tbody>
</table>

Abbreviation: NA, not applicable.

*Data from the 2002-2003 Joint Canada/United States Survey of Health.13

Table 3. Predictive Margin of Using Eye Care Services in the Previous 12 Months by Annual Household Income Among Adults
With Vision Problems

<table>
<thead>
<tr>
<th>Model</th>
<th>Lowest Quintile</th>
<th>Lower-Middle Quintile</th>
<th>Middle Quintile</th>
<th>Upper-Middle Quintile</th>
<th>Highest Quintile</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>52.4 (47.2-57.6)</td>
<td>63.6 (59.1-68.2)</td>
<td>58.0 (53.1-62.9)</td>
<td>63.9 (59.4-68.4)</td>
<td>68.1 (63.6-72.5)</td>
</tr>
<tr>
<td>VII: model V plus income level × optional vision insurance With optional vision insurance</td>
<td>65.7 (57.9-73.6)</td>
<td>66.5 (59.8-73.2)</td>
<td>63.9 (57.0-70.7)</td>
<td>68.1 (62.5-73.6)</td>
<td>70.4 (64.6-76.1)</td>
</tr>
<tr>
<td>Without optional vision insurance</td>
<td>42.7 (36.5-48.9)</td>
<td>60.3 (54.0-66.5)</td>
<td>52.0 (45.0-59.1)</td>
<td>60.3 (53.2-67.4)</td>
<td>66.8 (60.2-73.3)</td>
</tr>
</tbody>
</table>

*Data from the 2002-2003 Joint Canada/United States Survey of Health.13
different socioeconomic characteristics than those with landline telephones. However, the percentage of households without landline telephones was relatively low in both Canada and the United States at the time of this survey. Fourth, our analyses were based on self-reported or proxy-reported data rather than on measured or recorded indicators, and at least 1 study suggested that self-reports included a higher number of annual eye examinations with dilation of the pupils compared with medical records. Fifth, the survey assessed respondents' health insurance status at the time of the survey even though that status may have changed recently, thus possibly reducing apparent differences in rates of use of eye care services by category of health insurance. However, such bias would not affect the major conclusions of the study. Sixth, because this was a cross-sectional survey, we could not compare clinical outcomes associated with use of eye care services in Canada with those in the United States. Seventh, access to eye care is a multidimensional concept, and we explored only the major individual characteristics and use of eye care services. However, use does not mean that the care rendered was necessary or that it was appropriate. Future research is needed to explore other dimensions of eye care access.

CONCLUSIONS

Americans with vision problems who have health insurance accessed eye care services at a rate higher than or equivalent to that of their Canadian counterparts. Although Americans without health insurance accessed these services at a lower rate than Canadians did, this difference in access rates narrowed after we adjusted for income level and optional vision insurance. Moreover, optional vision insurance was independently associated with increased use of eye care services, and this association was strongest among individuals in the lowest income group.

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