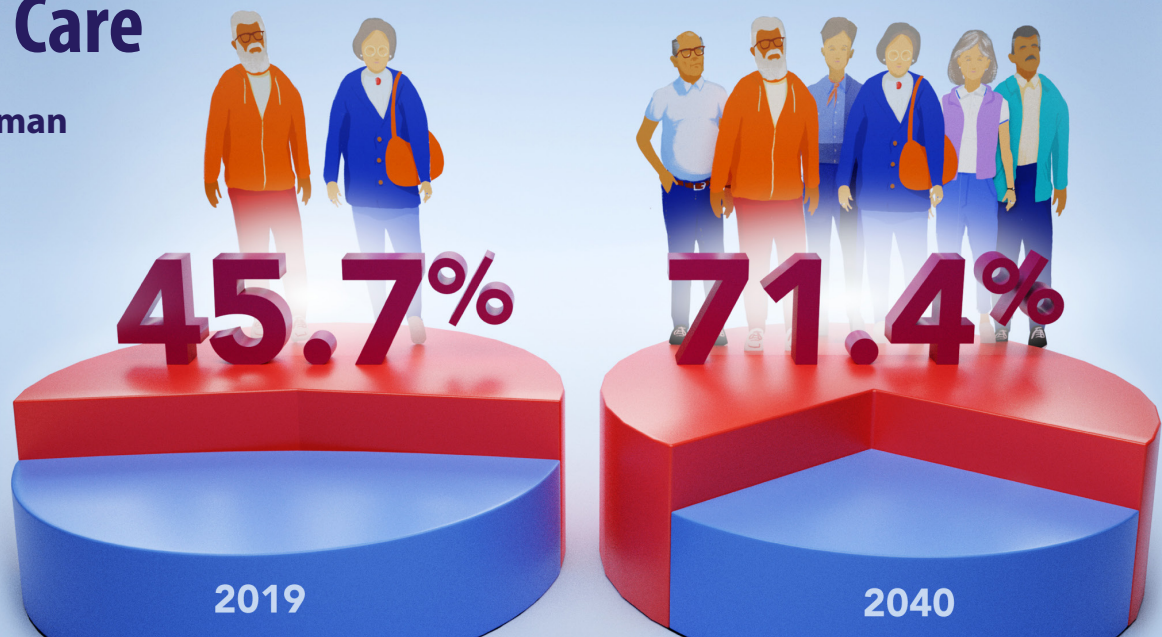


Aging and Expenditures on Health Care

by Steven Globerman



Summary

- Health care is the single largest budget item for every provincial government in Canada.
- Per-capita spending on health care is substantially higher for individuals aged 65 and older than for younger individuals, and the disparity increases consistently as average age increases beyond 65 years. For example, the per capita expenditure for the 80-85 age group was more than twice the mean per-capita expenditure across all age groups in Canada in 2017.
- Canada's population is projected to age substantially in the years ahead. Specifically, while individuals aged 65 and older accounted for 16.2 percent of the total population in 2018, they are projected to account for 23.4 percent of the population in 2040.
- Assuming no change in the prices of inputs to the provision of health care services, the growth in the number of Canadians aged 65 and older will result in an increase in health care expenditures of approximately 88 percent from 2019 to 2040.
- To put this projected increase into perspective, health care expenditures on individuals aged 65 and older accounted for 45.7 percent of total health care expenditures in 2019. Given the projected aging of the population, individuals aged 65 and older will account for fully 71.4 percent of total health care expenditures in 2040 in the absence of policies that improve the efficiency of health care delivery to this cohort of the population.

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Introduction

The COVID-19 crisis, which continues as of this writing, has wreaked havoc on government budgets by dramatically increasing government spending on health and income security-related programs, while decreasing anticipated tax revenues by contributing to a substantial contraction in employment and corporate profits.¹ While the long-term public health and economic consequences of the crisis are highly uncertain at this time, policy analysts have called attention to the likely growing financial burden that an aging population would place on Canada's health care system, even prior to the COVID-19 pandemic (Barua, Palacios and Emes, 2017). The COVID crisis might exacerbate the burden, not only in the short-run but perhaps in the longer-run as well, as evidence emerges of potential long-term adverse health consequences from having contracted the virus.²

Health care is the single largest budget item for every provincial government in Canada.³

¹ With regard to expenditures on health care, it is possible that delayed surgeries and other postponed medical interventions related to COVID-19 might have actually constrained the growth of health care expenditures in 2020. Available data do not permit any conclusions to be drawn on this issue; however, it seems likely that many postponed tests and procedures will be brought forward and added to future government health care expenditures, perhaps as early as 2021.

² For a detailed presentation of possible long-run impacts of the COVID-19 crisis on health care expenditures in Canada, see Conference Board of Canada (2020).

³ See Barua, Palacios and Emes (2017) for pre-COVID 19 data. Provincial and territorial government spending on health care accounted for slightly over 65 percent of total health care expenditures in Canada in 2019 (Canadian Institute for Health Information, 2021b).

Hence, projections for future health care needs are important inputs to any assessment of the future fiscal positions of provincial governments and, hence, also inputs to appropriate policy responses. Demographic changes, particularly changes in the age distribution of the population, are important influences on the future health care needs of the population. While changes in the levels of immigration along with changes in the age distribution of future immigrants will affect the age distribution of Canada's population in future years, current projections call for a steady aging of Canada's population.⁴

The purpose of this bulletin is to summarize existing evidence on the linkage between population aging and the demand for health care as measured by health care expenditures.⁵ A related purpose is to **estimate** changes in health care expenditures based on projected changes in the age distribution of Canada's population as well as the total number of individuals aged

⁴ For example, the Canadian Institute for Health Information (2017) projects that the number of Canadians aged 65 and older will increase by approximately 68 percent between 2017 and 2037, while the number aged 75 and older will slightly more than double. Rochon, Stall and Roebuck (2020) note that while about 17 percent of Canada's population was older than 65 in 2019, by 2026, more than 20 percent of its population will be 65 years and older. These projected increases vary modestly across provinces and territories.

⁵ Publicly financed health care expenditures are, at best, imperfect measures of aggregate demand for health care services since government health care budgets do not respond directly to demand for health care services as evidenced by relatively long wait times for many types of basic health care services in Canada. For recent evidence on wait times in Canada for medically necessary services, see Barua and Moir (2019).

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65 and older who are disproportionate users of the health care system.

While the age distribution of a population ordinarily changes relatively slowly, other factors, such as health care inflation, can change relatively quickly. Hence, long-run projections of health care expenditures strictly tied to demographic changes can be rendered moot to the extent that other determining factors change substantially in the interim. This is a caution against adopting a long-run period over which to evaluate the impact of population aging on health care expenditures. On the other hand, because demography changes relatively slowly, adopting a relatively short period ensures relatively modest observed changes. Hence, while the choice of any time period is somewhat arbitrary, this bulletin considers the projected changes in health care expenditures from 2019 to 2030 and 2040, respectively, when the aging of the youngest Baby Boomers and the oldest of the Generation X cohorts is projected to have a relatively large cumulative effect on Canada's age distribution.

The bulletin proceeds as follows. The next section briefly reviews evidence on how health status and the demand for health care vary over the “average” individual's life span. The bulletin then presents and discusses demographic forecasts for Canada over the next two decades. The next section combines the demographic forecasts with estimates of the age-specific costs of health care to identify changes in health care expenditures that can be expected as a result of Canada's aging population. The bulletin wraps up with concluding comments.

Health care expenditures and demographics

The broad consensus of the relevant literature identifies a notable pattern between aging and expenditures on health care. In particular, per-capita health spending by provincial and territorial governments is highest for seniors and infants (Canadian Institute for Health Information, 2021b). The higher expenditure associated with the one-time event of a birth is obvious. The increased spending on seniors and the very elderly, while also obvious, is a bit more complex. Specifically, seniors tend to have more numerous and more complex health problems than do younger people; however, the bulk of health care expenditures for the elderly are related to procedures in the last year of life (Brown and Suresh, 2004).⁶ While the distinction between ongoing health expenditures for the elderly and end-of-life procedures does not affect the reporting of health care expenditures by age group, it does have potentially important policy implications. In particular, an increased use of living wills and related health directives might affect the relationship between aging and health care expenditures, although these and related policy issues are beyond the scope of this essay.

The data reported in table 1 illustrate the relationship between age and health care spending in Canada.⁷ Specifically, table 1 reports current

⁶ Cebril, Rebitzer, Taylor and Votruba (2008), assert that the care of patients with chronic diseases accounts for 75 percent of annual health care expenditures in the US. Rosella, et. al. (2020) finds that health care use and spending in the last two years of life in Ontario are high. The result is attributed to a trend in hospital-centred care before death.

⁷ Health care expenditures by provincial and territorial governments cover medically necessary services. Therefore, they exclude expenditures

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Table 1: Actual and Index Values of Health Care Expenditure by Age Group (2017)

Age Group	Index Value	Expenditure
0-4	39.8	\$2,839
5 to 9	22.7	1,618
10-to 14	23.4	1,667
15 to 19	28.6	2,043
20 to 24	29.1	2,076
25-29	34.9	2,493
30 to 34	38.4	2,777
35 to 39	37.9	2,702
40 to 44	37.3	2,663
45 to 49	41.5	2,958
50 to 54	48.4	3,455
55 to 59	57.4	4,092
60 to 64	70.3	5,013
65 to 69	93.3	6,656
70 to 74	118.7	8,467
75 to 79	158.7	11,324
80 to 84	220	15,693
85 to 89	319.4	22,783
90+	422.7	30,152

Source: Author's calculations from data in Canadian Institute for Health Information (2021a).

dollar expenditures per capita on health care by provincial and territorial governments, as well as index values for per-capita current dollar expenditures on health care by provincial and territorial governments by age group in 2017.

related to dental care, outpatient pharmaceuticals, optometry, and elective plastic surgery, among other health-related activities. For several of these services currently not covered by government health insurance, especially expenditures on outpatient pharmaceuticals and optometry, expenditures per capita can be expected to be higher for older people.

The index values were created by dividing the per-capita current dollar expenditures reported for each age group by the unweighted mean value of the per-capita current dollar expenditures across all age groups.⁸ Since the main focus of the next section is on projected changes in health care expenditures associated with projected changes in demography, converting per-capita dollar values for different age groups into index values allows for easier and more obvious projections of total expected changes in health care expenditures.

There are several caveats regarding the information presented in table 1. First, 2017 was the latest year for which data on per-capita health care expenditures was available. It is certainly possible; indeed, it is likely, that per-capita expenditures by age group have been affected by the COVID-19 pandemic. In particular, the disproportionate hospitalization rates of older people during the pandemic suggest that health expenditure index values for older cohorts of Canadians would be higher using 2020 data, while the index values for younger cohorts would be correspondingly lower. Whether and to what extent pandemic-specific changes in per-capita expenditures on health care persist into future years is a matter of speculation at the time of writing. Since data for 2017 was the latest available, we are obliged to assume that the relative distribution of health care expen-

⁸ We calculated the unweighted (by total population) mean per-capita expenditure across all age groups reported in table 1 in 2017 to be \$7,134. Hence, \$7,134 is effectively the base for calculating the index value for each age group. The Canadian Institute for Health Information (CIHI) (2021a) reports provincial/territorial government health expenditures per capita in Canada as \$4,360 in 2017. The latter is effectively the weighted (by population) estimate of per-capita provincial/territorial government health expenditures in table 1.

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ditures across age groups will revert to the pre-pandemic distribution in the relatively near term for purposes of projecting changes in health care expenditures over the next 10 to 20 years.

A second caveat is the assumption that the relative distribution of per-capita health care expenditures across the various age groups for 2017 is representative of longer-run patterns and not a single year anomaly.⁹ For example, factors such as health care inflation rates and innovations in medical technologies might have different effects on per-capita expenditures for specific age groups. Such possible changes going forward are also matters of speculation. While it is possible that specific future innovations such as the substitution of home-based hospice care in place of institutional hospice care might reduce per-capita expenditures for the elderly relative to younger age cohorts, new and relatively expensive personalized cancer therapies, if approved for use in Canada, might have the opposite effect. It must therefore be acknowledged that the analysis in the next section relies heavily upon the assumption that the calculated index values reported in table 1 are likely to be relatively accurate projections of values in 2030 and 2040.¹⁰

⁹ It is reassuring in this regard that the share of public health care dollars spent on Canadian seniors did not change significantly from 2000 to 2013. Specifically, the share increased by 1.4 percent, while the percentage of seniors in the population increased by 2.2 percent. See Canadian Institute for Health Information (2015).

¹⁰ By using index values rather than dollar values to identify differences in health care expenditures across age groups, we avoid the need to make assumptions about future inflation rates for health care, as well as other factors that affect all age groups more or less equivalently.

A third caveat is that table 1 combines the group of children under age 1 with the 1- to 4-year age group, since the demographic data discussed in the next section combines those two groups into a single age group. In fact, the index value for the group under the age of 1 (i.e., newborns) is almost seven times the index value for the 1 to 4 age group. Hence, it was advisable to create a population-weighted (as opposed to an unweighted) average per-capita expenditure index value for the two groups using births in 2019 as the estimate for the total population of newborns and the actual reported number of 1- to 4-year-olds in 2019.¹¹

The data reported in table 1 reinforce other findings and, indeed, the conventional wisdom, that per-capita health care expenditures are substantially larger for the over-65 age groups, especially for the most elderly.¹² For example, the per-capita expenditure for the group aged 80 to 85 is over twice the mean per-capita expenditure across all age groups, while the per-capita expenditure on the group aged 90 and older is more than four times the mean per-

¹¹ By way of anticipation, we use 2019 demographic data in this section since it was the latest available on Canada's age distribution at the time of writing this bulletin. Again, the implicit assumption is that the distribution of per-capita health care expenditures across age groups in 2017 is a relatively accurate representation of the (unavailable) distribution for 2019 and later years.

¹² There is a fairly substantial literature on population demographics and health care expenditures. Barua, Palacios and Emes (2017) underscore that proximity to death, as opposed to age *per se*, strongly affects health care expenditures. However, given much higher mortality rates for the elderly than their younger counterparts, this distinction might not matter much for purposes of projecting health care expenditures as a function of changing demographics.

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capita expenditure. Hence, any substantial changes in health care expenditures that are purely a function of an aging population will largely reflect changes in the proportion and number of the very elderly population.

Projected changes in demographics

While demography is a slowly changing phenomenon, it seemed advisable to use the latest actual year available for Canada's age distribution (2019) to compare to projections of Canada's age distribution for 2030 and 2040. This invites a risk that the health care expenditure index values reported in table 1 changed between 2017 and 2019. However, given the dominant influence exerted by expenditures on the most elderly, it is unlikely that using health expenditure data for 2019, where those data available, would lead to substantively different findings regarding the impact of aging on future health care expenditures in Canada.

Table 2 reports the ratio of the population of various age groups to Canada's total population in 2019, as well as the ratios of expected populations of the individual age groups to Canada's expected total population in 2030 and 2040.¹³ The data reinforce expectations that Canada's population is likely to age over the next 20 years. In particular, people 65 and older accounted for 16.2 percent of Canada's total population in 2019. They are projected to account for 22.3 percent of Canada's population in 2030 and 23.4 percent in 2040. The largest relative expected declines are for the 55-69 and 50-64 age groups. The former groups accounted for 7.3 percent and 6.7 percent, respectively, of

¹³ The source of actual and projected populations is Statistics Canada, *Table 17-10-0005-01: Population Estimates as on July 1st, by Age and Sex*. The data correspond to the M1 projection scenario.

Table 2: Share of Population by Age Group

Age Group	2019	2030	2040
0-4	0.051	0.049	0.049
5 to 9	0.054	0.051	0.05
10 to 14	0.055	0.052	0.051
15 to 19	0.056	0.058	0.056
20 to 24	0.066	0.064	0.062
25 to 29	0.07	0.061	0.063
30 to 34	0.069	0.065	0.064
35 to 39	0.069	0.069	0.063
40 to 44	0.064	0.068	0.065
45 to 49	0.064	0.066	0.067
50 to 54	0.067	0.06	0.065
55 to 59	0.073	0.057	0.061
60 to 64	0.067	0.057	0.055
65 to 69	0.056	0.063	0.051
70 to 74	0.045	0.056	0.05
75 to 79	0.031	0.045	0.051
80 to 84	0.021	0.033	0.042
85 to 89	0.014	0.018	0.027
90+	0.009	0.008	0.013

Source: Author's calculations from data in Statistics Canada, Table 17-10-0057-01.

Canada's total population in 2019. Their expected shares are 6.0 percent and 5.7 percent, respectively, in 2030 and 6.1 percent and 5.5 percent, respectively in 2040.

An important caveat to note with regard to table 2 is that the population forecasts are for both males and females combined. To the extent that the gender mix changes over time, and to the extent that health care expenditures per capita vary by gender within age groups, a failure to adjust for changes in gender mix

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within age groups implies that resulting projections of health care expenditures tied solely to changing age distributions will not, strictly speaking, reflect only the effect of aging on health care expenditures.

We examined the potential relevance of this caveat by comparing the share of males (by age group) in the actual population of 2019, as well as the projected share of males (by age group) in the forecast total populations of 2030 and 2040. While there are modest changes in the shares across the three years, the estimated correlation coefficients between the proportion of males by age group in the 2019 population and the shares in the projected 2030 and 2040 populations are both above .98, respectively. Hence, a changing gender mix is unlikely to be a significant factor affecting projected changes in health care expenditures associated with an aging population.

Another caveat with respect to table 2 data is related to the COVID-19 pandemic. Specifically, the tragic death toll from the pandemic has been disproportionately large for the elderly, especially those in long-term care facilities and nursing homes. Unless the pattern of mortality from the pandemic changes in the future, the likely outcome is that there will be fewer individuals who are currently in their 70s and 80s surviving into their 80s and 90s. The inference one can draw is that the population projections for the elderly reported in table 2 for 2030 and 2040 are likely to prove overestimates. On the other hand, it is possible that advances in health care over the next two decades, and hopefully an end to the pandemic in the near future, will extend the healthy lifespans of those currently in late middle-age, so that greater percentages of those cohorts will survive to advanced old age.

Projected changes in health care expenditures

Health care expenditures in 2019, 2030, and 2040 are estimated by multiplying the health expenditure index values for 2017 for each age group reported in table 1 by the share of total population for each age group in each of the three years, and then adding the product terms across all of the age groups. The summation provides an estimate of health care expenditures expressed in index number form for each of the sample years. This procedure identifies expected changes in health care expenditures associated with changes in the shares of the individual age groups. In effect, it identifies the expected change in health care expenditures associated with an increase in the average age of the population. We shall also identify the expected change in health care expenditures associated with a growing number of individuals aged 65 and older.

There are several important assumptions underlying the index number procedure. One is that the procedure assumes no inflation in the cost of health care over the sample period. In effect, it holds prices for health care inputs constant at their 2017 values. This is obviously an unrealistic assumption. However, since the focus of the essay is strictly on the relationship between aging and health care expenditures, we want to hold constant other factors influencing future health care expenditures besides demography. Moreover, given the focus of the essay, the relevance of changes in the quality-adjusted prices of health care inputs is operative only to the extent that health care inflation rates differ across age groups. It is certainly possible that health care inflation in the future will vary across age groups, but whether and to

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what extent it would bias our projections is unclear.¹⁴

A second assumption is that the policy environment in which Canada's health care system operates will not fundamentally change over the sample period. Again, the relevance of this assumption applies to the relationship between demographics and health care spending. In this regard, the mortality rate associated with COVID-19 has been disproportionately high in nursing and retirement homes. This development might lead to substantial changes in how long-term care is provided to the elderly, including changes in how such care is paid for. It is certainly possible, therefore, that significant changes in the share of health care expenditures accounted for by the elderly may result.

In short, the health care expenditure projections discussed below are driven entirely by expected changes in Canada's age distribution. The latter is arguably the least malleable determinant of future health care expenditures. Hence, the projections underscore the relevance of other public policy initiatives to mitigate increases in this major current and (likely) future source of provincial government spending.¹⁵

¹⁴ For a discussion of the linkage between health care inflation and new technologies, see Weisbrod (1991). Rochon, Stall, and Roebuck (2020) argue that there is a looming shortage of geriatricians, which might imply that prices of health care practitioners with particular skills to serve elderly patients might increase at above-average rates.

¹⁵ The Conference Board of Canada (2020) anticipates that almost half of the increases it projects in health care expenditures out to 2030 will reflect inflation affecting the health care sector. About 18 percent will be due to population growth and 19 percent due to population aging.

Table 3: Share of Population x Expenditure Index

Age Group	2019	2030	2040
0-4	2.03	1.95	1.95
5 to 9	1.23	1.16	1.14
10 to 14	1.29	1.22	1.19
15 to 19	1.6	1.66	1.6
20 to 24	1.92	1.86	1.8
25 to 29	2.44	2.13	2.2
30 to 34	2.68	2.53	2.49
35 to 39	2.62	2.62	2.39
40 to 44	2.39	2.54	2.43
45 to 49	2.66	2.74	2.78
50 to 54	3.24	2.9	3.15
55 to 59	4.19	3.27	3.5
60 to 64	4.74	4.03	3.89
65 to 69	5.22	5.88	4.76
70 to 74	5.34	6.65	5.94
75 to 79	4.92	7.14	8.09
80 to 84	4.62	7.26	9.24
85 to 89	4.47	5.75	8.62
90+	3.8	3.38	5.49

Source: Author's calculations from data in Statistics Canada, Table 17-10-0057-01.

Table 3 reports the product terms for the share of the population accounted for by each age group multiplied by the calculated health care expenditure index for each age group for 2019, 2030, and 2040, respectively, along with the sum of the calculated product terms. The main observation is that the index of health care expenditures is projected to increase by 8.6 percent between 2019 and 2030 and by 18.3 per-

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cent between 2019 and 2040.¹⁶ The primary and unsurprising explanation for these findings is the growing share of the population 65 years and older post-2019.

The Canadian Institute for Health Information (2021b) estimates that government spending on health care (all levels) in 2019 was approximately \$185 billion. Using 2017 per-capita health care expenditures, the growing average age of Canada's population suggests that government spending on health care will increase to approximately \$201 billion by 2030 and to around \$218 billion by 2040.

The preceding estimates to this point reflect solely the effect of expected increases in the average age of Canada's population. The latter, in turn, primarily reflects a growing share of people 65 and older in the population. This share increased from 17.6 percent in 2019, to 22.3 percent in 2030, to 23.4 percent in 2040. It also reflects the increasing longevity of seniors. The average age of the 65 and older cohort was 74.6 years in 2019. It is expected to increase to 77.1 years by 2040.

The total impact of a growing and aging senior population on health care expenditures needs to also account for the total number of seniors in different age groups. Table 4 reports the total number of Canadians aged 65 and older and the total expected health care expenditures for that number considering the distribution of seniors across the various age groups for indi-

¹⁶ It is interesting in this regard that the Canadian Institute for Health Information (2015) asserts that population aging, *per se*, increased health care costs by 0.9 percent per year between 2000 and 2013. Over a 20-year period, the cumulative increase would approximate our estimated 18.4 percent increase.

Table 4: Total Number 65 + and Total Health Care Expenditures 65 +

	Number (000s)	Expenditure (\$ billions)
2019	6,507	74.81
2030	9,407	110.04
2040	10,746	140.52

Source: Author's calculations.

viduals 65 and older.¹⁷ Total health care expenditures for individuals aged 65 and older are projected to increase from \$74.61 billion in 2019 to \$110.04 billion in 2030 and then to \$140.52 billion in 2040. This translates to an increase in health care expenditures for seniors of 47.5 percent from 2019 to 2030 and an increase of 88.3 percent from 2019 to 2040. These estimates assume that health care expenditures per capita remain constant at their 2017 values. Hence, it seems fair to argue that these future estimates of health care spending on Canadians 65 and older are conservative.

There are various ways to put the expected increase in spending on Canadians aged 65 and older into perspective. One way is to project the share of total health care expenditures that would be spent on Canadians aged 65 and older given projected changes in their share of the population using 2017 per-capita expenditures by age group and comparing those estimates to the projected expenditures on health care

¹⁷ The total projected population of seniors is multiplied by 2017 expenditures per capita for each age group to arrive at estimated total expenditures in each year.

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assuming the age distribution of the population did not change post-2019. Projected health care costs in 2019, 2030, and 2040 assuming no change in the age distribution of the population can be obtained by multiplying the projected population in each sample year by the mean (weighted by age group) per-capita expenditure on health care in 2017, i.e., \$4,360.

Table 5 reports the ratio of projected total health care expenditures for those 65 and older relative to projected total health care expenditures assuming that the age distribution of the Canadian population and per-capita health care expenditures for the different age groups do not change after 2019. The calculated ratios, in effect, show how the share of health care expenditures accounted for by those aged 65 and over would increase in 2030 and 2040 compared to 2019 given projected changes in the number of individuals in that age group compared to a scenario where the age distribution of the population remained constant between 2019 and 2040.

The projections summarized in table 5 are striking. Estimated expenditures on Canadians aged 65 plus in 2019 (i.e., \$74.61 billion) account for 45.7 percent of what the total estimated expenditures on health care would be for the Canadian population in 2019 assuming no change in the weighted mean per-capita expenditure on health care (i.e., approximately \$163.31 billion). In 2030, estimated expenditures on individuals aged 65 and older (\$110 billion) will account for 60.3 percent of total expenditures assuming an unchanged age distribution (\$182.63 billion). In 2040, estimated expenditures on the older cohort (\$140.52 billion) will account for fully 71.4 percent of total expenditures assuming an unchanged age cohort (\$196.9 billion).

Table 5: Projected Share of Total Health Care Expenditures on Those Aged 65 + (percent)

2019	2030	2040
45.7	60.3	71.4

Source: Author's calculations.

A clear implication of the projected scenarios summarized in table 5 is that a growing number of older and increasingly elderly Canadians will take a substantially larger share of the total health care budget unless governments increase real per-capita health care expenditures for those below the age of 65 or implement policies that improve the efficiency of health care provision to Canada's oldest residents.¹⁸

Concluding comments

Among the important economic and social consequences of an aging population is the impact that this demographic phenomenon will have on health care spending. Increased inflation-adjusted spending on health care is primarily a function of a greater share of the population moving into above-age-65 categories over the next two decades. While other phenomena, including inflation and changes in health care technology, are likely to be quantitatively more important determinants of future health care costs than an aging population, the effect of a growing senior population is far from trivial.

¹⁸ As noted earlier, a substantial share of spending on the elderly occurs in the last year or two of life. A shift toward more hospice care in place of hospital care could mitigate these end-of-life costs.

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Hence, a challenge for policymakers is to identify and implement new techniques and procedures that will provide health care services more economically to seniors without sacrificing efficacy. A related challenge is to prevent or delay the health problems that are characteristic of a senior population before younger age cohorts move into the senior category.

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