A Tale of Two Countries: Changes to Canadian and U.S. Senior Population Projections due to the Pandemic—Implications for Health Care Planning in Canada and Other Western Countries

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Abstract

To examine COVID-19 mortality demographics to determine if there will be any substantive shifts in population forecasts that will impact health and long-term care planning for seniors in both countries. Demographic data from Statistics Canada and the U.S. Census Bureau to 2060 are adjusted for COVID-19 age-group-specific mortality and then projected forward in five-year increments. These projections are then annualized using a linear imputation between each projected value. Consideration is given to the seniors 65+, 75+ and 85+ as well as dependency ratios of each age category. Forecasts suggest that the proportion of seniors in the population will roughly plateau in 2035 at approximately 21% (U.S.) and 24% (Canada)—with another uptick observed beginning in 2050 for those aged 75+. Adjustments due to the pandemic have had little impact on these projections suggesting that—unless there is a major shift in the demographics of pandemic-related mortality—the resource planning implications will be largely inconsequential. Investments in resources to serve seniors need not be done with the intention to repurpose these assets before they are fully depleted. While the demonstrated demographic plateau is likely to hold steady, there is uncertainty around the expected rate of decline in the health of seniors. Depending on this trajectory, community-level social supports could play a large role in lengthening the duration of senior health and independence.

Keywords Demographics · Seniors · Social Supports · Health · Human Resources

JEL Classification J11 Demographic trends · Macroeconomic effects · Forecasts

Note: The views expressed in this paper do not necessarily represent the views of the Ontario Ministry of Health nor the Treasury board Secretariat and should not be construed as representing an official position

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Introduction

There have been many forecasts analyzing the potential impact of the aging Western baby-boom generation\(^1\) on social services, health care budgets, and overall public finance. While the baby-boom generation began to turn 65 in 2011, the real effects on social and health care services were generally not expected until this generation began to turn age 75 in 2021. At this age, the gradient of dependency on social services and illness-associated-with-aging increases dramatically (NCHS, 2011; CIHI, 2021).

On one hand, there are those who have noted reduced disability rates amongst this generation in comparison to earlier ones. This suggests that the rate of decline may not be as steep as with previous generations (Manton et al., 2006; Singer & Manton, 1998). Alongside this reduction, some have suggested that productivity gains and increased tax revenue from older workers—no longer forced to retire at age 65—will offset the fiscal burden placed on governments (Lee & Skinner, 1999). An alternative scenario, proposed by some in the past, indicates that the social, health, and financial burdens of the aging baby-boomers will be great, with nearly a third of gross domestic product (GDP) dedicated to health care by 2030 (Warschawsky, 1994). Additionally, the number of long-term care residents will more than triple during the 50 years between 1990 and 2040 (Schneider & Guralnik, 1990). Lastly, there is a real question of whether old-age pension and benefit programs will remain solvent, given the growing number of individuals expected to rely on these funds (Costa, 2007). The recent COVID-19 pandemic now needs to be added to the mix potentially altering long-term forecasts.

The near future remains unclear regarding health and long-term care resource planning for seniors, and with the pandemic taking a heavy toll on seniors, this future is even more uncertain. Certainly, the magnitude of this pandemic is an order of magnitude smaller than the influenza pandemic of 1918 which lowered life expectancy by 12 years in contrast to just over one year with COVID (Andrasfay & Goldman, 2021; National Archives and Records Administration, 2022).\(^2\) Yet, the population distribution is different between the two pandemics with seniors making up a much larger percentage of the current population than in 1918; thus, the larger issue today concerns the implications for the resource demands of an aging population in 2022. At this juncture, it is important to examine what may occur. This paper both examines long-term demographic data from the U.S. and Canada to determine the age-mix of the population in these two countries by 2060 both with and without the pandemic factored in. It is natural to expect that there will be a reduction in the number of seniors vis-à-vis younger generations given fertility rates at just below replacement.

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\(^1\) The baby-boom generation is generally understood to mean the generation in Western countries born after World War II extending up until the early- to mid-1960s although the end date of this era varies slightly between countries.

\(^2\) Given that Canadian COVID-19 mortality is even more skewed towards older ages than in the U.S., the implication is that there were fewer life-years lost in Canada. Therefore, U.S. estimate on lost life-expectancy can serve as an upper bound for the drop in Canadian life expectancy.
Consequently, there could be excess capacity in resources that the baby-boom generation utilized during their senior years. If so, these resources will need to be repurposed. And unlike in the famous novel that inspired the title of this paper, it is shown that future trends in these two countries are likely to be marked by similarities rather than contrasts regardless of the pandemic and its effects (Dickens, 1999).

Given that seniors are likely to live alone and increasingly without the support of family and friends, they are often highly dependent on various community level social supports such as meals-on-wheels, homecare agencies, faith-based organizations, and even healthcare providers. The risk to health from social isolation amongst seniors is also of concern; therefore, seniors may be the group most able to benefit from the presence of increased community-level social supports (Abbott & Sapsford, 2005; Marziali & Donahue, 2001). According to the 2006 Canadian Census, over 26% of households – one-third of them seniors – contained an individual living alone (Statscan, 2006). Further, lone-person households increased by approximately 25% in Canada from 1996 to 2006—a growing trend that is likely to continue as the baby-boom generation ages further (Statscan, 2006). Depending on the findings in the demographic data, increasing the availability of some resources targeted to seniors might be necessary. Yet, the roll-out may require that these resources be repurposed at some point. This paper investigates whether this is a major concern that needs to be incorporated into present-day planning in Canada taking into account the impact of the COVID pandemic and using the U.S. data as a backdrop to suggest that the findings and discussion might apply to other Western countries.

**Methods**

Demographic data and forecasts were obtained from both Statistics Canada and the U.S. Census Bureau (Statscan, 2015a, b; U.S. Census Bureau, 2014a). Forecasts to 2060 were obtained for both countries with the Canadian forecasts providing annual data while we utilized U.S. forecasts providing estimates every five years. The analysis assumed that change occurred in equal increments during the interim years between U.S. forecasted figures to obtain an annualized U.S. data series. For each country, the data were also divided by age into different categories; therefore, to make the Canadian data directly comparable to those of the United States, the percent of age 60–64, 70–74, 80–84 population were calculated from the age 60–69, 70–79, and 80+ supplied groupings respectively using the original population projections for 2021. Those percentages are then used to calculate the 20–64, 65+, 75+, and 85+ age groups with and without COVID deaths subtracted in 2021 and thereafter from established overall mortality forecasts split into age-groups according to percentages by age-group of those deceased (IMHE, 2020; Government of Canada, 2020). For example, the 65+ age group is defined as

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3 A reviewer noted that there are U.S. projections available by single year of age and single years, 2017–2060. While optimally, these would be more accurate than what has been estimated here, the differences are unlikely to produce substantially different results which would impact the research findings.
For the US data, the respective COVID mortalities are subtracted from the original projections for the following age groups in 2021: <18, 18–64, 65+, 75+, and 85+ (IHME, 2020; NCHS, 2020). To transform the US age 18–64 category into an age 20–64 category aligned with the Canadian data, US 20–64 population projections—in the absence of COVID-19—are calculated by taking the percentage of age 18–64 that would fall within the age 20–64 category assuming an approximate uniform distribution across ages.

Using the population modified with COVID mortalities in 2021 as a baseline, subsequent populations are then projected forward in five-year increments using the original percent change from census data for that period. The population is first projected to 2025 and then subsequently projected every 5 years. The data are annualized within the 5-year periods using linear imputation by assuming yearly change occurred in equal increments.

For the comparative analysis, consideration is given to the senior age categories 65+, 75+ and 85+ as well as dependency ratios of each age category to age 20–64 through 2060—the last year for which both countries have produced forecasts.

Data were also obtained regarding life expectancy at birth both prior to the pandemic and forecasted to 2062/63 for Canada and to 2060 for the U.S. in the absence of the pandemic. Similarly, forecasts on immigration and fertility rates for both countries were obtained (Bohnert et al., 2015). All of these factors may be mediators of demographic shifts; therefore, a close examination of these data may be needed. All calculations and graphs were produced using Microsoft Excel 2013.

Results

The percentage of seniors (age 65+) were originally expected to grow from 16.3% in 2016 to 25.4% by 2060 in Canada and from 15.3% in 2016 to 23.6% by 2060 in the U.S. (Fig. 1). The corresponding figures for those age 75+ were originally from 7.0% in 2016 to 14.4% by 2060 in Canada and from 6.4% in 2016 to 12.6% in the United States. Regarding those aged 85+, the corresponding percentages were originally from 2.2% in 2016 to 5.7% by 2060 in Canada and from 2.0% in 2016 to 4.8% by 2060 in the United States. It should be noted that the percentage of seniors increases and then plateaus shortly after 2040. The plateauing effect occurs later for the older cohorts, but decreases were not observed during the examined forecasted years except for a small downturn after 2050 in those aged 85+. The COVID-19 pandemic has an insignificant impact on these forecasts partially owing to the current pattern of mortality that is skewed heavily toward those already over the age of 80 (Tables 1 and 2).

Furthermore, the trends suggest that Canada is forecasted to have a higher percentage of seniors than the U.S. in each age category with the difference narrowing...
in later years owing to resurgence in the rate of growth in the U.S. senior population leading up to 2060 irrespective of the impact of the pandemic (Figs. 1, 2 and 3).

Regarding the dependency ratio of age 65+ to age 20–64, the estimate originally increased from 0.265 in 2016 to 0.474 by 2060 in Canada and from 0.258 in 2016 to 0.432 by 2060 in the United States. Closely resembling the trends in the percentages of seniors in the population, these results plateau beginning after 2040 with the Canadian data showing a higher dependency ratio than for the U.S. with the magnitude of difference growing and then narrowing somewhat by 2060. The COVID-19 pandemic only makes a marginal difference in the dependency ratio with a reduction of ≤0.004 in both countries by 2060 (Fig. 4).
Regarding life expectancy at birth, Canadian males prior to the pandemic had an average life expectancy of 80.7 years—a figure which was expected to increase 6.9 years to 87.6 years by 2062/63 (Bohnert et al., 2015). Canadian females prior to the pandemic had a life expectancy of 84.5 years increasing to 89.2 years by 2062/63 (Bohnert et al., 2015). There is also some indication that a substantial portion of this increase in life expectancy is due to a decreasing probability of death at any particular age (Bohnert et al., 2015). In the U.S., life expectancy at birth for males prior to the pandemic was 77.1 years increasing to 84.0 years by 2060 (U.S. Census Bureau, 2014b). For American females, life expectancy at birth prior to the pandemic was

| Age Group          | Number  | Percent |
|--------------------|---------|---------|
| 0–17 years         | 826     | 0.09%   |
| 18–29 years        | 5,802   | 0.62%   |
| 30–49 years        | 57,704  | 6.18%   |
| 50–64 years        | 175,440 | 18.78%  |
| 65–74 years        | 213,583 | 22.86%  |
| 75–84 years        | 240,001 | 25.69%  |
| 85+ years          | 240,886 | 25.78%  |
| Total              | 934,242 | 100%    |

Table 1 United States: mortality projection to June 1st 2022, by age category

| Age Group          | Number  | Percent |
|--------------------|---------|---------|
| 0–17 years         | 30      | 0.08%   |
| 20–29 years        | 106     | 0.29%   |
| 30–39 years        | 262     | 0.72%   |
| 40–49 years        | 584     | 1.61%   |
| 50–59 years        | 1,617   | 4.46%   |
| 60–69 years        | 3,852   | 10.63%  |
| 70–79 years        | 7,678   | 21.18%  |
| 80+ years          | 22,116  | 61.02%  |
| Total              | 36,245  | 100%    |

Table 2 Canada: mortality projection to June 1st 2022, by age category

National Center for Health Statistics (NCHS) (2020). “Provisional Death Counts for Coronavirus Disease (COVID-19): Weekly Updates by Select Demographic and Geographic characteristics.” Accessed 15 Feb 2022. [https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm#AgeAndSex](https://www.cdc.gov/nchs/nvss/vsrr/covid_weekly/index.htm#AgeAndSex)

Government of Canada. Coronavirus Disease 2019 (COVID-19): Epidemiology Update. See Figure 7 toggling for deceased. Accessed 15 Feb 2022. [https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html](https://health-infobase.canada.ca/covid-19/epidemiological-summary-covid-19-cases.html)

Toggle for Canada and deaths [https://covid19.healthdata.org/global?view=cumulative-deaths&tab=trend](https://covid19.healthdata.org/global?view=cumulative-deaths&tab=trend)
81.7 increasing to 87.1 by 2060 (U.S. Census Bureau, 2014b). It is likely that life expectancy decreases in Canada owing to the pandemic will be less than in the U.S. This difference is mostly due to the heavier skew of COVID-19 mortality toward Canadian seniors—particularly amongst the oldest seniors—than is evident in the U.S. (Andrasfay & Goldman, 2021; Government of Canada, 2020; NCHS, 2020) (See Tables 1 and 2; Fig. 5).

For each country, fertility rates are both expected to stay relatively stable or slightly decline for most ethnic groups up to 2060. The exception is a projection to 2030 of modest increases in fertility rates regarding individuals who originated from Asian countries (Bohnert et al., 2015; Colby & Ortmann, 2015). Concerning immigration, the patterns diverge slightly between countries. The age structure

![Figure 2](image-url)
of Canadian immigrants likely will lower the average age of the population while the American immigrants will likely raise average age.

Thus, immigration in the U.S. helps to maintain or increase the percentage of seniors over time while immigration in Canada serves to contain growth in this percentage by 2060 (Loh & George, 2007; Colby & Ortman, 2015). In 2014, 13.2% of seniors in the U.S. were foreign born which is projected to increase to 25.8% by 2060 (Colby & Ortman, 2015). In Canada, the inclusion of immigrants in the population forecasts suggest that 27.2% of the population will be age 65+ by 2056 which, in the absence of immigrants, would have been higher–32.5% (Loh & George, 2007).
A sensitivity analysis indicates that both increasing COVID-19 mortality by six-fold and redistributing age-group deaths according to population proportions does little to impact policy implications. By 2060, the COVID-19-related projections decrease by less than two percentage points leaving the overall proportions of seniors only marginally lower than if the pandemic had not occurred. There will still be a plateau albeit slightly reduced from what would have been heretofore projected.

**Discussion**

Recent findings of a one-time drop in life-expectancy owing to the pandemic needs to be examined longitudinally for the purposes of planning for a large increase in the senior population in the years ahead. Contrary to some expectations, there is no indication that there will be a decline in the percentage nationally of the population age 65+ neither in Canada nor in the U.S. once the baby-boom generation has
largely died off by 2060. These trends appear to be true irrespective of the effects of the pandemic; yet, it should be noted that planners and policymakers—often focused on population subgroups—should be aware that these subsets may not exhibit the relative stability and immunity to short-term deviations like COVID that national projections do. While the argument holds that health care resources targeted to seniors will continue to be demanded by them at high levels nationally long into the future even though there may be variations within the population. Nationally, this stability could be due to the mixing of the baby-boom with its echo generation amongst the senior population in later years or perhaps due to increases in life expectancy—six to seven years by approximately 2060 or due to a short-term rebound effect post-pandemic as the average vulnerability of the population may be lessened somewhat by the accelerated demise of the most vulnerable due to COVID. The critical salient point is that, although each cohort enters the ranks of seniors concurrently at age 65, they do not exit simultaneously, and this effect dominates any effect that the pandemic may have.

As individuals traverse their senior years, there may be some lengthening of this period, owing to increases in life expectancy over the next 40 years in both countries after factoring in the one-time drop due to the pandemic. It is plausible, that two generations will increasingly co-exist amongst the senior population in future years. Nevertheless, demographic trends may eventually produce a decrease in the percentages of seniors in the population in both countries; however, there is no evidence of this in the available data. Lastly, there may be important intranational demographic differences owing to the likelihood that young people tend to settle more in urban centres. (Molloy et al., 2011).

The old-age dependency ratios (Fig. 4) closely emulate the patterns in Figs. 1, 2 and 3, indicating that changes in the percentages of seniors are driving these
ratios upward. With persistently low fertility rates in both countries, the size of the younger cohorts is likely to remain stable or slightly decline in the future. Further, the difference in immigration age-structures between the two countries—with the U.S. welcoming greater percentages of older immigrants than Canada—could help explain the narrowing in the percentage of seniors between the two countries by 2060 (See Figs. 1, 2 and 3).

Despite this narrowing, Canada will have a higher percentage of seniors irrespective of the pandemic than in the U.S. with the dependency ratios also remaining higher (See Figs. 1, 2 and 3). While the countries may have slightly different forecasting methods, there are some other reasons that might account for the differences observed. Despite similar fertility rates across both countries during the two decades following the end of World War II, Canadian population growth has been supplemented by decades of heavier immigration from the developing world than in the United States. During FY 2014, the U.S. had overall population growth of 0.79% of which 0.32% was attributed to legal immigration (U.S. Census Bureau, 2016; U.S. Department of Homeland Security, 2016). In Canada, the most recent statistics from 2012 suggest the overall population is growing at an annual rate of 1.2%, with nearly two-thirds of this growth (0.74%) due to immigration (Statscan Demography Division, 2016). These rates have remained relatively constant over the last two decades producing population pyramids that will increase the ranks of seniors in Canada by a greater percentage than in the United States. In particular, there is currently a significantly higher percentage of residents between the ages of 45 to 60 in Canada than in the United States (United Nations, 2016).

Also, the future senior population may be larger than officially projected in the U.S. owing to a large and growing percentage of undocumented immigrants through its border with Mexico. If so, the future percentages of seniors may be closer to those forecast for Canada. Given these concerns with the American data and the differences in the denominator of the dependency ratio—18–64 for the U.S. vs. 20–64 for Canada—the difference in dependency ratios may actually be smaller than projected.

Optimally, the analyses—including the calculation of the dependency ratios—would require recalibration of the models to re-run the projection series in their entirety for the impact of the pandemic rather than relying on post hoc adjustments as presented. Firstly, model recalibration produces forecasts that minimize the potential for error whereas post-hoc adjustments heroically assume that the factors impacting change are static—particularly problematic for years farther into the future. This is even more pronounced during periods when the forces of change are highly variable. Ultimately, a recalibrated model will provide more accurate and valid results than a forecast that relies on post hoc adjustments; nevertheless, the results obtained provide sufficient accuracy to answer the question of whether resources need to be eventually repurposed.

Given the potential for a sustained large percentage of seniors in the population, general findings regarding the health and health trajectory of seniors should be of concern to decision-makers. According to Statistics Canada’s Survey on Disability, approximately 13.7% of the adult population reported having a disability limiting their daily activities in 2012—a number that is expected to grow to 20% within 20 years (Statistics Canada, 2013; Rick Hansen Foundation, 2015). One third of Canadians aged 65 + and 43% among those 75 + reported having a disability.
Pain, mobility and flexibility limitations were most prevalent, followed by mental or psychological disability. Over one quarter of persons with disabilities were classified as very severe and 81.3% reported using aids and assistive devices (Statistics Canada, 2013).

On average, frail older adults and persons with disabilities utilize more health care services than relatively healthy adults. With an aging population, the level of overall disability may increase albeit slowed somewhat by the generally healthier status of aging baby-boomers compared to earlier generations (CIHI, 2011; Public Health Agency of Canada, 2014). Further, current events may render the population projections herein inadequate much like those around the influenza pandemic of 1918 with the interplay with typhus, tuberculosis and World War I (Noymer & Garenne, 2000). In current times, the effects of climate change and its indirect effects on mortality could obfuscate the forecasts examining mortality related to COVID in isolation.

Assuming that the age-group specific disability rate remains constant in Canada, the number of seniors aged 65+ with a disability is likely to increase from 2 million in 2016 to 4.4 million in 2060 with 1.1 million having a severe disability (Statistics Canada, 2013). Although changing demographics are likely to produce increases in the overall rate of disability potentially leading to higher health care costs, it may still be possible to bend the cost curve without compromising quality of care in the future through innovative payment and insurance systems that provide proper incentives and are relatively easy to implement (Marchildon & Di Matteo, 2015; Nauenberg, 2014).

Further, society needs to adopt innovative forms of community-level social supports to either maintain health or at least reduce the rate of decline. Knickman and Snell (2002) suggest that communities need to “…learn how to tap the human resources that elders represent in the community.” An example of this might be to construct nursery schools facilities within old-age homes as both children and seniors mutually benefit from contact with each other. The authors also suggest that examples like this might help to “…alter the cultural view of aging to make sure all ages are integrated into the fabric of community life” (Knickman & Snell, 2002). If so, the societal impacts of increasing old-age dependency ratios presented may be lessened.

Regarding the connection between well-being/health and the level of social supports, resources currently being redirected toward seniors may have a longer lifespan serving this population than previously thought. Nevertheless, some resources that are being commissioned shortly, particularly capital resources, may have a lifespan beyond 2060 during which some decline in the percentage of seniors is possible and eventual repurposing of these resources needs to be considered. While the current generations of elderly may be healthier than previous generations, inevitably illness or frailty will occur towards the end of life requiring greater amounts of community-level social supports to serve a growing population. Meals-on-wheels programs, assisted living and long-term care homes, home care services, and even shifts in health care provider roles could be on the horizon. Rarely would a physician specializing in a certain area be unable to transition within their specialty so long as their training continues to be initially broadly based and sub-specialization is not their sole post-graduate training. For example, geriatricians typically come from internal medicine, and they may practice in both worlds. Endocrinologists who see patients with diabetes treat other endocrine disorders. Regarding capital resources, such as long-term care homes, these
facilities could have a sufficiently long lifespan that they may need to be repurposed at some point. Ideas for transformation include low-income housing or even immigration absorption centres as the West attempts to avoid a population decline owing to persistently low fertility rates. Thus, even if the demographics eventually shift towards a more predominantly younger population, repurposing human and capital resources may not be a difficult problem.

The larger question—irrespective of the pandemic—is what will become the predominant pattern amongst the baby-boom generation? Will this generation generally experience a longer life span with even longer years of healthy life than previous generations or will they experience the same pattern of slow decline over a greater amount of time? If the former, then their dependency in their later years will be less than previous generations lessening the effects of the growth rates in their numbers. However, if not, much in the way of planning efforts should be underway shortly as the baby-boom generation has already begun to exceed 75 years-of-age.

Declarations

Conflicts of Interest None.

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