

Physician workforce planning in Canada: the importance of accounting for population aging and changing physician hours of work

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Canada has long struggled to maintain an appropriately sized physician workforce.¹⁻⁴ The recruitment of foreign-trained physicians over recent decades and, starting in the mid-2000s, increased domestic enrollments in medical schools has led to Canada currently having an historically high physician-to-population ratio.⁵ However, concerns about physician shortages and burnout,⁶⁻⁸ as well as limited access to physician care,^{9,10} continue.

Previous analyses of physician supply and demand have not adjusted for both population aging and evolving physician hours of work, despite discussions of these factors being quantitatively important.^{11,12} To provide insights into the aforementioned challenges — and to inform the profession, the public and governments in planning regarding the appropriate number of new physicians who should enter practice — we analyzed data from 1987 to 2020 to quantify increasing demand because of an aging population and changing service supply given declining physician self-reported hours of work (Box 1).¹³⁻¹⁵

Why is adjusting for population aging and physician hours of work important?

Unadjusted analyses have shown that the physician workforce grew at a much faster rate than the overall population between 1987 and 2020 (93% v. 43% growth).^{5,16} This begs the question: If Canada had a perceived physician surplus in the late 1980s, and the size of the physician workforce has subsequently increased at a rate faster than the rate of population growth, why has patient access to care become problematic?³ Adjusting for changing population demographics and physician hours of work can offer an answer.

Figure 1 presents our findings of trends in population numbers and physicians in Canada from 1987 to 2020, both before and after adjustment for population aging and changing physician average weekly hours of work. In panel A, the age–sex-adjusted population quantifies the increasing demand for physician services relative to the unadjusted population. As panel B makes clear, the full-time equivalent (FTE) supply of physicians is lower than the absolute count (except, by construction, in 1987). Adjustment for physician hours of work showed that, starting in the mid-1990s, a gap opened between the number of

Key points

- Although Canada's absolute physician-to-population ratio has increased and is at an historic high, reports of physician shortages and inadequate patient access to physicians abound.
- To reconcile these observations, we analyzed workforce data for physicians from 1987 to 2020, and adjusted the population size to address population aging and the number of physicians to account for changing hours of work.
- Although the unadjusted physician-to-population ratio in 2019 was 35% higher than it was in 1987, we found that full adjustment showed the ratio to be about 4% lower.
- Our analysis shows that measures of physicians per capita need to be complemented with both demand- and supply-side adjustments to inform planning for health human resources in medicine; relying on simple trends in physicians-per-capita ratios for workforce planning is not helpful.

physicians and the FTE number of physicians. (Caution is required in interpreting 2020, which coincided with the onset of the COVID-19 pandemic.)

What is the trend in physician hours of work?

Figure 2 depicts trends in self-reported physician weekly hours of work over time. These estimates include weeks in which physicians engaged in work and weeks in which they undertook no work (e.g., vacation, illness or caregiving). We show observed (unadjusted) hours as well as similar series adjusted for physician sex (variable as self-reported to Statistics Canada in the Labour Force Survey), and both age and sex. These adjusted series explore the change in average hours of work associated with the increasing share of physicians who self-identify as female and workforce aging. Our observed trends are consistent with those of studies that used more limited data from Canada or comparator nations.¹⁷⁻²¹

In Figure 2, the unadjusted trendline (bottom) shows that average hours of work declined by 21.6%, from 49.1 hours per week in 1987 to 38.5 hours per week in 2020. When excluding whole week absences, the decline is 20.6%, from 54.3 to 43.1 hours per week. For comparison, Statistics Canada reported that, for the entire

Box 1: Methods

We obtained billing data on physician care by patients' age and sex, and annual counts of practising physicians from the Canadian Institute for Health Information (CIHI). Statistics Canada provided population demographics and the monthly Labour Force Survey microdata. From the survey, we calculated a consistent annual measure of self-reported hours of work by physicians. The annual sample of physicians ranged from about 1700 to 3800 from 1987 to 2020, for a total of about 93 000. As far as we are aware, using the survey to analyze the supply of physician hours is novel. Previous estimates of hours, generated from different surveys by the Canadian Medical Association (CMA) and its partner organizations, used varying methodologies and are available for only a subset of relevant years.¹³ The CIHI provides a full-time equivalent (FTE) measure in its *Physicians in Canada* report; however, this is derived from clinical payments and does not provide consistent trends over time.^{14,15}

To adjust for population aging, for each year after 1987 (the base year), we calculated how much larger a population with the 1987 age–sex distribution would need to be to require the same number of hours of medical care as that later year. This allowed standardized comparisons for age and sex across populations in different years, while holding services per age–sex cell constant. Relative physician hours by age–sex group were proxied by relative physician expenditures because data on hours by patient age and sex do not exist. We held service provision constant at its 1996 level, which is the earliest year with available data.

To generate each year's supply of FTE physicians, we defined 40 hours of self-reported work per week to be 1 FTE. However, for much of our analysis we indexed the results relative to 1987, and any fixed weekly hours would have produced the same index. Details on the data and methodology are provided in Appendix 1 (available at www.cmaj.ca/lookup/doi/10.1503/cmaj.221239/tab-related-content).

workforce aged 25 years and older, average weekly hours of work in the same years, including absences, declined by 9.5%, from 35.7 to 32.3.²² Among occupations, physicians have consistently been an outlier with high hours of work.¹⁷

Age–sex adjustment (the upper line) accounts for 2.5 hours of the 10.6-hour decline seen in 2020 in the unadjusted analysis. Adjusting only for sex, the middle line shows a small gap opening in the early to mid-1990s that does not subsequently expand; the gap is 1.3 hours in 2020. The overall decline in average physician hours of work was only modestly affected by the increasing share of physicians identifying as female. Females had lower average hours, but that average was relatively stable from 1987 to 2020. In contrast, the hours of male physicians declined, and the gender gap in hours diminished across the period. Adjustment to account for the aging of the physician workforce, depicted as the gap between the sex-adjusted line and the uppermost age–sex-adjusted line, begins to show a worrying trend starting around 2005 that is relevant to policy. The gap between the sex-adjusted estimate of hours worked and the age–sex-adjusted estimate represents 1.2 hours per week in 2020.

How do adjustments for population aging and physician hours of work affect historical trends?

Figure 3 shows that, as workforce planners have pointed out, since the late 1980s — when Canada had a perceived surplus of physicians — the absolute number of physicians per capita has only risen over time. Moreover, the per capita supply increased markedly starting in the late 2000s. However, when the needs of Canada's aging population are considered (MDs/age–sex-adjusted 100 000 population in Figure 3) much of the increase is seen to be

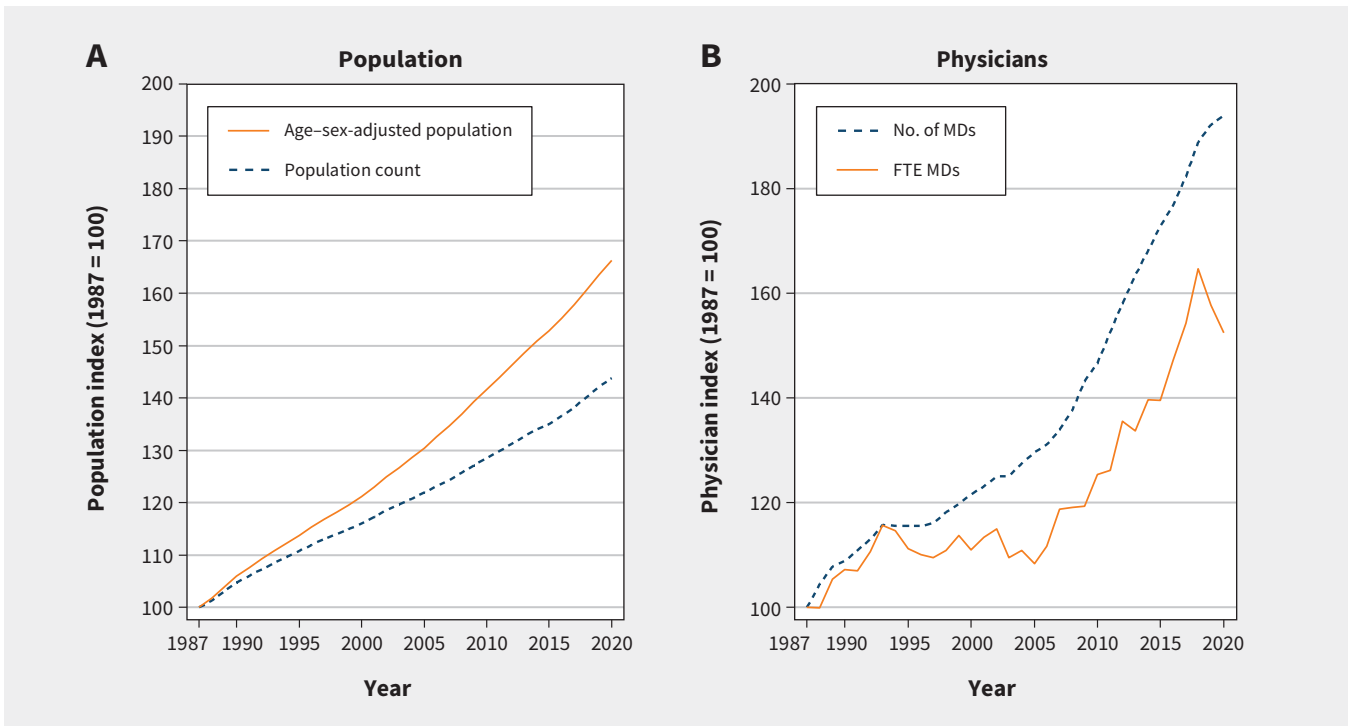


Figure 1: (A) Unadjusted and age–sex-adjusted population count, and (B) absolute and FTE physician numbers in Canada from 1987 to 2020. Note: FTE = full-time equivalent.

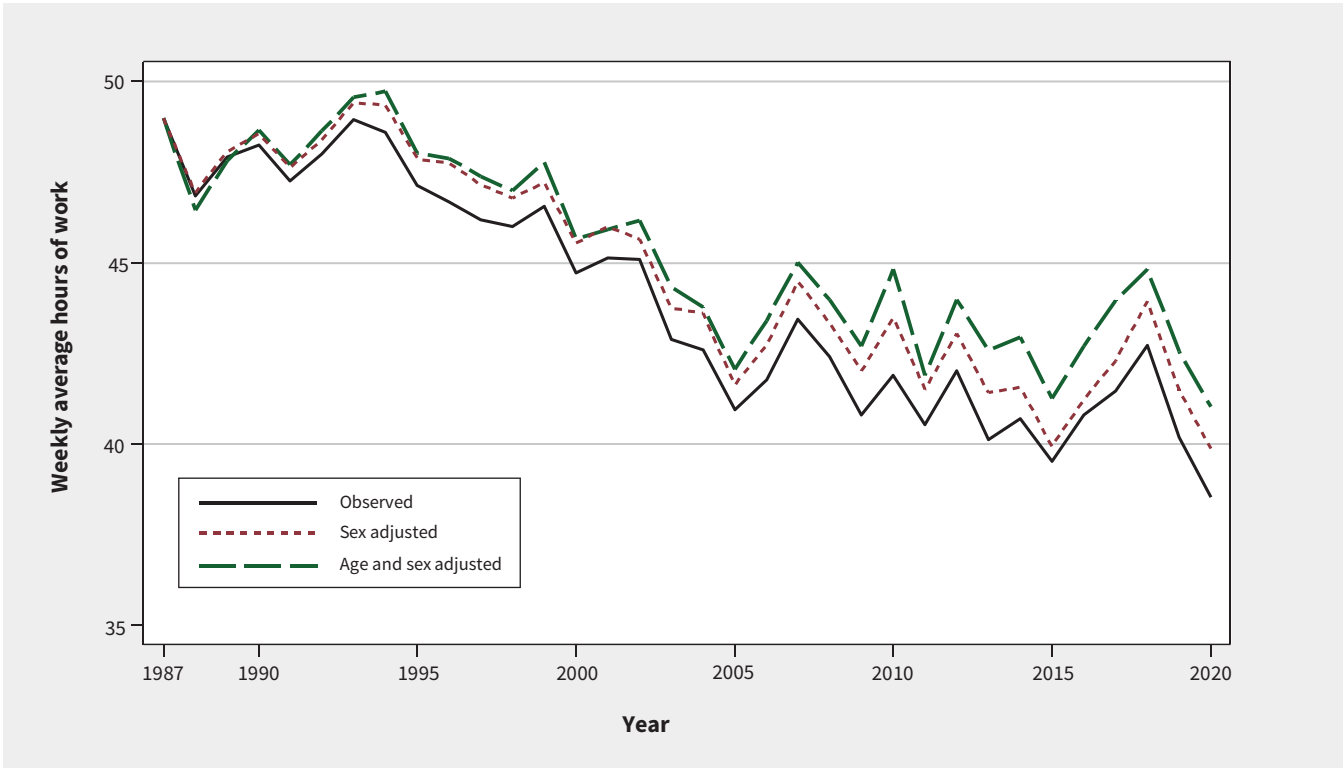


Figure 2: Weekly average hours of work by physicians in Canada, including those away for a full week, observed unadjusted and adjusted for sex, and age and sex, from 1987 to 2020.

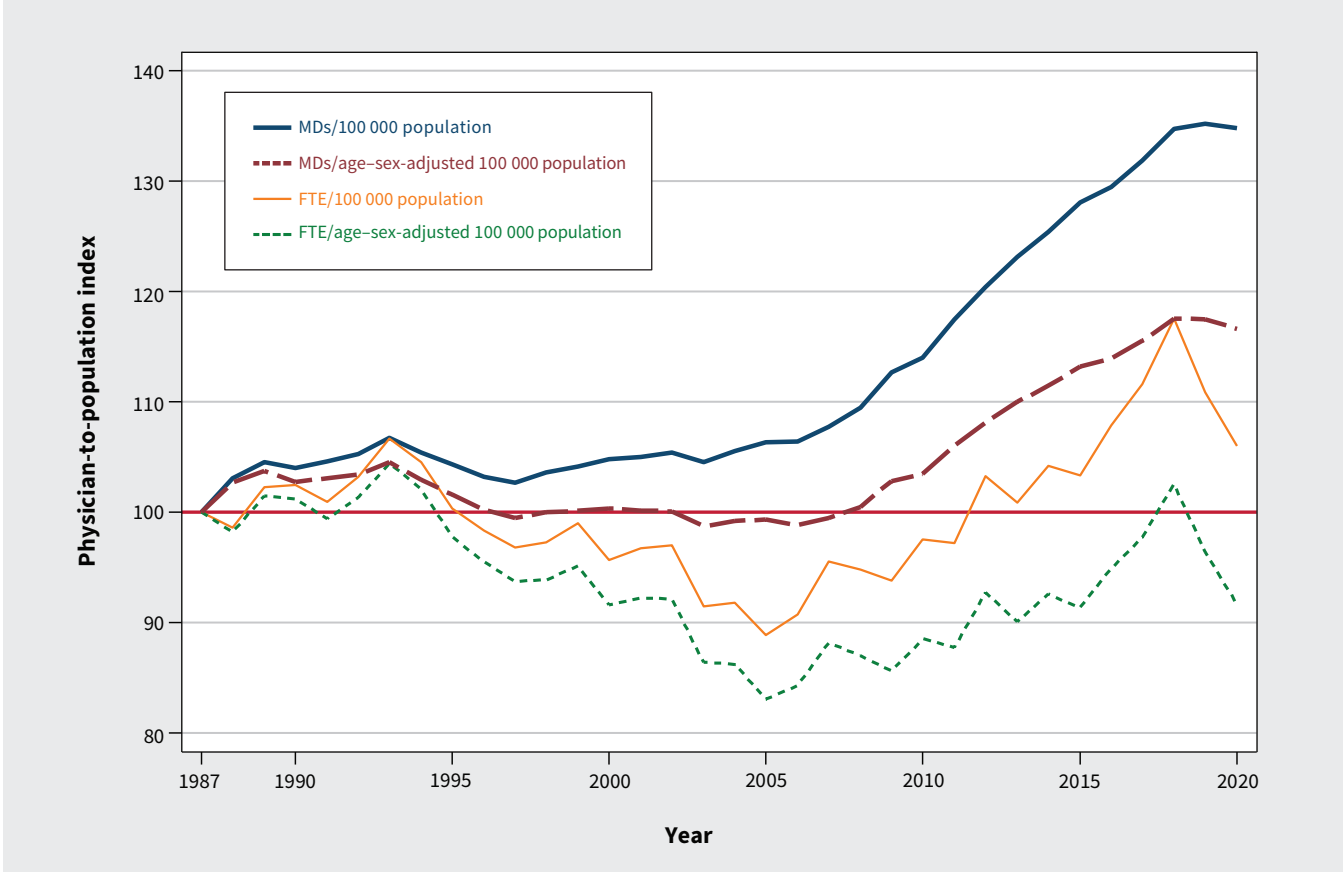


Figure 3: Physicians per capita, adjusted and unadjusted (index 1987 = 100, red solid line). Note: FTE = full-time equivalent.

offset by increased demand. By 2020, population aging can be interpreted to have consumed about 18 percentage points of the increase of 34 percentage points in physicians per capita.

Adjusting only for the decline in physician hours of work, the third line from the top of Figure 3, generated a larger gap relative to the simplistic “MDs/100 000 population” trend than did the patient age–sex adjustment. Its trajectory also differs. This gap opened earlier, and its rate of increase slowed after about 2005. Acknowledging that physician hours of work recorded in 1987 were unsustainably high, the reduction in hours by 2005 was roughly equivalent to a 10% reduction in the number of practising physicians relative to 1987 and a 15-percentage-point reduction compared with the MDs/100 000 population curve. By 2019 (avoiding 2020, which was affected by the COVID-19 pandemic), the reduction in hours of work meant that the effective labour supply of physicians was 25 percentage points lower than the conventional MDs/100 000 population benchmark.

The bottom curve in Figure 3 combines the 2 adjustments and shows — at the lowest point, in 2005 — a 17% reduction in FTE physicians per age–sex-adjusted Canadian compared with 1987. A rebound followed that was driven by the growing number of practising physicians, and, by 2019, the number of FTE physicians per age–sex-adjusted population was 4% below that in 1987, and 39 percentage points below the unadjusted line. Figure 3 illustrates the substantial empirical differences in estimates associated with relatively simple adjustments.

Is there regional variation in physician supply across Canada?

Plots comparable to those in Figure 3 are presented in Appendix 2, available at www.cmaj.ca/lookup/doi/10.1503/cmaj.221239/tab-related-content, broken down by region in Canada with the less populous provinces aggregated. Although the fanning out of the 4 curves is broadly similar, the declines in FTE physicians per age–sex-adjusted population before 2005 occurred primarily in British Columbia, Manitoba and Saskatchewan, and Ontario.

Figure 4 presents the number of FTE physicians per 100 000 population adjusted for age and sex in Canada and 6 regions employing 3-year moving averages. Substantial heterogeneity is observable across both time and regions. For comparison, the thick line is the Canadian average. Although Figure 4 displays hours rather than indexes relative to 1987, the U-shaped pattern observed in the bottom curve of Figure 3 is visible for most but not all regions. Alberta and the Atlantic region do not follow the national pattern.

The variation across regions, except for Ontario (an outlier in the early years), was much larger in 2020 than in 1989. Moreover, Ontario experienced one of the largest swings in physician supply, and Manitoba and Saskatchewan have consistently had a relatively low physician supply.

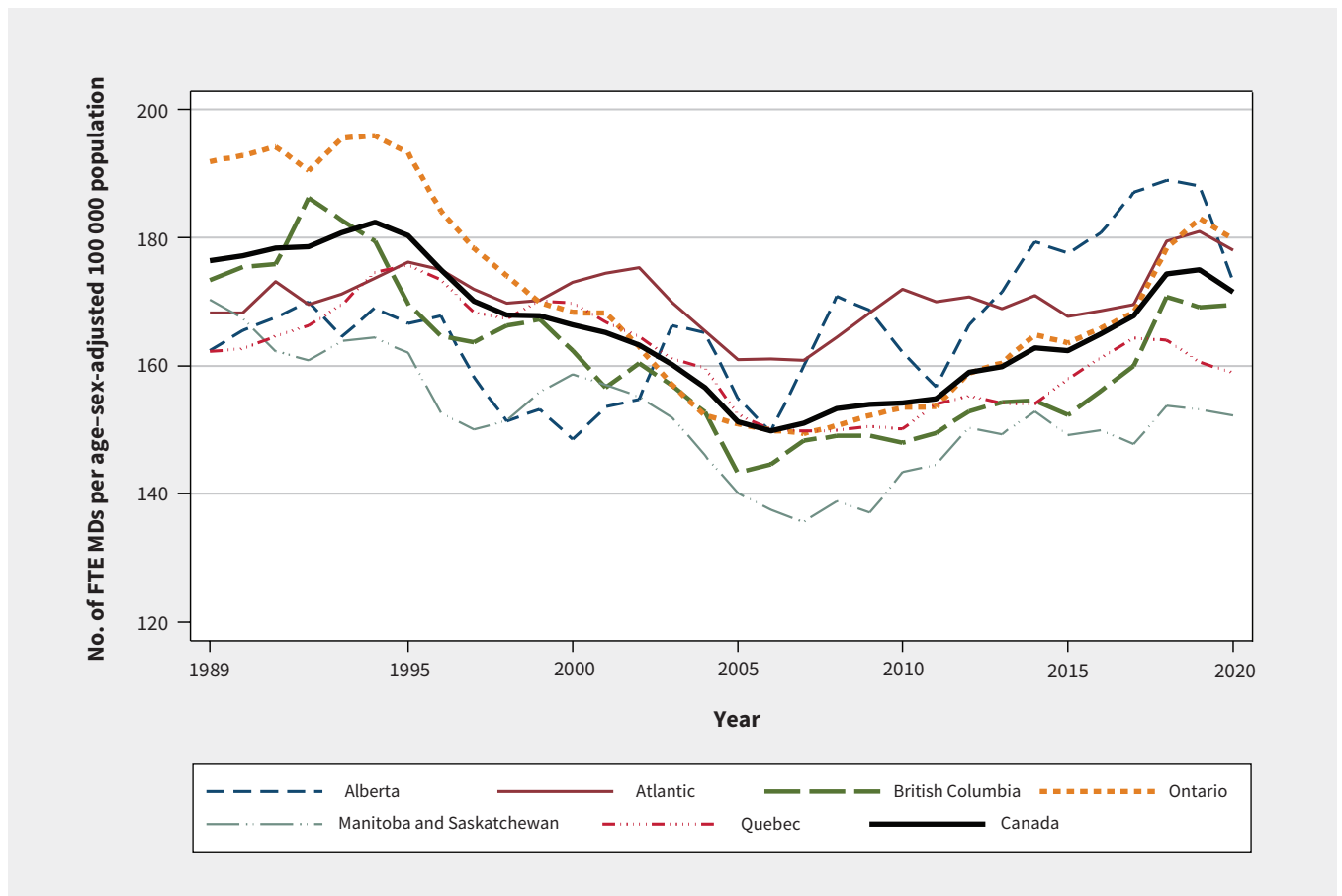


Figure 4: Regional distribution of FTE physicians per age–sex-adjusted 100 000 population (3-year moving averages). Note: FTE = full-time equivalent.

What does this analysis mean for physician workforce planning in Canada?

Despite the absolute number of physicians increasing at a faster rate than the general population of Canada between 1987 and 2020, reports of physician shortages and excessive wait times for access to health care began to appear in the mid-1990s. Simple adjustments for population aging and physicians' hours of work reconcile these inconsistent observations. As our analysis shows, the increasing needs of an aging population have been empirically important since around 2005, while the supply of physician service hours has simultaneously declined in a manner that is largely unrelated to the evolving age–sex composition of the physician workforce. Thus, relying on simple trends in physicians-per-capita ratios for workforce planning is misleading and not helpful.

Our analysis does not evaluate trends for the greater part of the COVID-19 pandemic, given the current availability of data from the Canadian Institute for Health Information. However, we did observe a notable dip in hours worked by physicians in 2020, which we consider to be attributable to circumstances related to the pandemic. Any analysis of physician work trends during the COVID-19 pandemic would probably require higher frequency data than the annual aggregate employed herein.

Given the data available to us, we can only speculate regarding the reasons for the decline in working hours beyond the findings presented in Figure 2. We consider that about a quarter of the decline in hours worked could be associated with an increasing proportion of older and female physicians in the workforce, as these groups worked fewer hours, on average, than the historical norm. Another possibility is that physicians reducing their average number of hours was a response to physician burnout.^{6,7,23–25} Burnout may be driven, in part, by the combination of clinical and nonwork responsibilities, with the latter possibly increasing.^{19,21} In a 2022 cross-sectional survey involving Ontario physicians, improved work–nonwork balance was cited as 1 of the top 3 potential solutions to burnout.²⁶ Another possible explanation is that the proposal that compensation increases exceeding target incomes have caused a cut-back in service provision.^{27,28}

Although our analysis is informative, it and the 2 simple adjustments we employed have limitations. For example, we held service provision per age–sex group constant at its 1996 level. This was appropriate for the question under evaluation, but it is likely that service provision per standardized person may have increased over time. Moreover, although the Labour Force Survey data (Statistics Canada) had the advantage of being consistently defined, the survey measured only total hours of work and did not allow hours of direct patient care to be separated from hours dedicated to activities such as administration, research and continuing medical education.^{17,29} If hours of direct patient care have reduced as a share of total hours, then the FTE adjustment employed in our analysis was too small in later years. Changing technology and practice styles likely also need their own adjustments. Furthermore, we chose not to disaggregate general and family practitioners from other specialists. This extension was feasible with these data but would make this analysis longer while not adding to the basic message.

Conclusion

Simple adjustments for aging and physician work hours do not answer all questions about the disconnect between the growth in physicians per capita and reports of physician shortages. However, we have shown that such adjustments can have substantial impact for understanding long-term trends in physician workforce availability. Our analysis also helps to reconcile public experiences of physician shortages with the perceptions of those who focus on unadjusted trends that show rising numbers of physicians per capita in Canada. Planning for physician supply should take adjustments such as these into account as a matter of course, especially given the length of training for new physicians.³⁰ Pursuing a range of additional adjustments in future estimates would be helpful in efforts to maintain an appropriately sized physician workforce in Canada.

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gave final approval of the version to be published and agreed to be accountable for all aspects of the work.

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