

# Differences by sex in supply, payments and clinical activity of family physicians in Ontario: a retrospective population-based cohort study

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## Abstract

**Background:** The proportion of women entering medicine has increased in recent years, and understanding the different practice patterns of female and male family physicians (FPs) will provide important information for health workforce planning. We sought to evaluate differences by sex in the supply, payments and clinical activity among FPs in Ontario.

**Methods:** We conducted a cohort study using claims data from the Ontario Health Insurance Plan. We included all Ontario FPs who submitted claims from 1992 to 2018. We analyzed data using regression analyses for our outcomes of yearly number of FPs, payments, patient visits and distinct patients.

**Results:** The number of practising FPs increased from 10370 in 1992 to 14329 in 2018, with an annual increase of 155 female FPs and 13 male FPs. In 2018, male FPs outnumbered female FPs by 1159. Among male FPs, 32.7% worked less than 1 full-time equivalent (FTE) position, 18.1% worked 1 FTE and 49.2% worked more than 1 FTE, with little change over the 27-year study period. Among female FPs, the percentage of those who worked less than 1 FTE position decreased over time (58.6% in 1998 to 48.3% in 2015), those who worked 1 FTE was stable (22.2%–24.3%) and those who worked more than 1 FTE increased (18.7% in 1998 to 28.0% in 2017). Yearly payments were higher for male FPs than female FPs by 40%–60% overall and by 10%–20% in FPs who worked more than 1 FTE. For FPs who worked 1 FTE or less than 1 FTE, both sexes had similar payment amounts (from 2005–2018). For FPs who worked 1 FTE, female FPs were less likely to receive payments from fee-for-service after 2004, and had 550 fewer visits and 121 fewer patients annually than male FPs.

**Interpretation:** In Ontario, there are differences by sex in FP supply, payments, percentages of FTE groups, number of patient visits and number of distinct patients. Health administrators should be mindful of these differences when considering FP workforce plans to ensure a stronger primary health care system, with adequate health care delivery for the population.

Following the lead of Elizabeth Blackwell,<sup>1,2</sup> an increasing number of women are entering the physician work force.<sup>3</sup> In 1968, 7.2% of all physicians, including 8.5% of family physicians (FPs), in Canada were women.<sup>4</sup> By 2018, this proportion had increased to 42.1% for all physicians and 46.6% for FPs.<sup>4</sup> In 2018, the proportion of female FPs (45.1%) in Ontario was slightly lower than in other provinces (47.4%) and territories (52.3%).<sup>4</sup> The influx of female physicians may bring distinctive values and interests affecting their professional practices.<sup>1,5</sup> Understanding the different practice patterns of female and male FPs will provide important information for health workforce planning.

Previous studies have suggested that, in general, male physicians earn more than female physicians.<sup>6–8</sup> As a physician's earnings are closely related to workload, controlling the influence of varied levels of physician workload makes the comparisons by sex more meaningful. We sought to evaluate differences by sex in supply, payments and clinical activity among FPs in Ontario.

## Methods

### Setting and study design

Using health administrative data from 1992 to 2018, we conducted a retrospective, population-based cohort study to examine differences by sex in FP supply, payments and clinical activity in Ontario. In Ontario, medically necessary health services are insured by a single payer, the Ontario Health Insurance Plan (OHIP).

We report this study in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guideline.<sup>9</sup>

**Competing interests:** None declared.

This article has been peer reviewed.

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**CMAJ Open 2022 May 17. DOI:10.9778/cmajo.20210068**

## Participants

We included all FPs who submitted claims to OHIP from 1992 to 2018. Information available included unidentifiable physician number, birth year, sex, specialty, number of patient visits, number of unique patients, physician total payment from OHIP, whether the physician's fee-for-service payment was greater than 50% of his or her total OHIP payment and year of service.

## Data sources

Data sets used included the OHIP physician billing database, the ICES Physician Database and the Registered Persons Database. Database linkage was done by ICES in a secured environment and unlinkable physicians were removed. Deidentified data were released to us for analysis.

## Exposure, outcomes and covariates

We assessed physician supply through the yearly number of FPs.<sup>10</sup> We evaluated clinical activities by establishing a physician's full-time equivalent (FTE) positions (a proxy of physician workload), number of patient visits, number of unique patients and number of visits per patient. We measured physician workload by FTE, which was calculated using the method developed by Health Canada based on total payment (converted to 2018 Canadian dollars)<sup>11</sup> and used in reports of ICES and the Canadian Institute for Health Information.<sup>10,12–14</sup> Each FP was allocated into 1 of the 3 FTE groups: 1 FTE (yearly payments between the 40th and 60th percentiles), less than 1 FTE (below the 40th percentile) and more than 1 FTE (above the 60th percentile).<sup>10,12–14</sup>

Physician sex was the exposure variable. Our outcomes were yearly physician numbers, patient visits, unique patients, physician payment, proportion of physicians with payment from fee-for-service greater than 50% of their total payments, physician FTE and physician age. However, in analytical models, some of the outcome variables were included as covariates.

## Statistical analysis

We calculated the median of the number of visits, the number of unique patients, the number of visits per patient, physician payments and physician age for each year, overall and by physician sex and FTE group. We also reported the number of physicians by year, sex and FTE group.

We used linear multilevel regression models (i.e., linear mixed models) to evaluate the association between the outcomes (payments, number of patients, number of visits, visits per patient) and physician sex and year. Multilevel models are suitable for this type of data as they can account for autocorrelation of outcomes within FPs; FPs have multiple observations over time. For each outcome, we tested for different parameterizations for the time trend (fixed effects) and the variance within FPs (random effects), and selected the model with the best overall fit based on the Bayesian Information Criteria (BIC) (i.e., when comparing 2 models, the model with the smallest BIC was selected).

All models included physician sex, year, sex-year interaction (to test whether the gap between the sexes widens or narrows over time) and physician age. Models for payment also included the number of patient visits, number of distinct patients seen and number of visits per patient. Models for number of patients, number of visits and number of visits per patient included FTE groups as well. For each outcome, predicted values for male and female physicians in each year were estimated from the adjusted models with other variables in the model at their mean values. These predicted values are presented graphically.

## Ethics approval

This study was approved by the University Health Network Research Ethics Review Board.

## Results

The total number of active FPs was 10 370 in 1992 and increased 38.2% to 14 329 in 2018 (Figure 1). A large increase was seen in female FPs, with an average yearly increase of 155. For male FPs, the average yearly increase was 13. Despite the significant increase in female FPs, male FPs still outnumbered female FPs in 2018, with a male-to-female difference of 1159. The variability in demographic characteristics of the FPs is shown in Table 1.

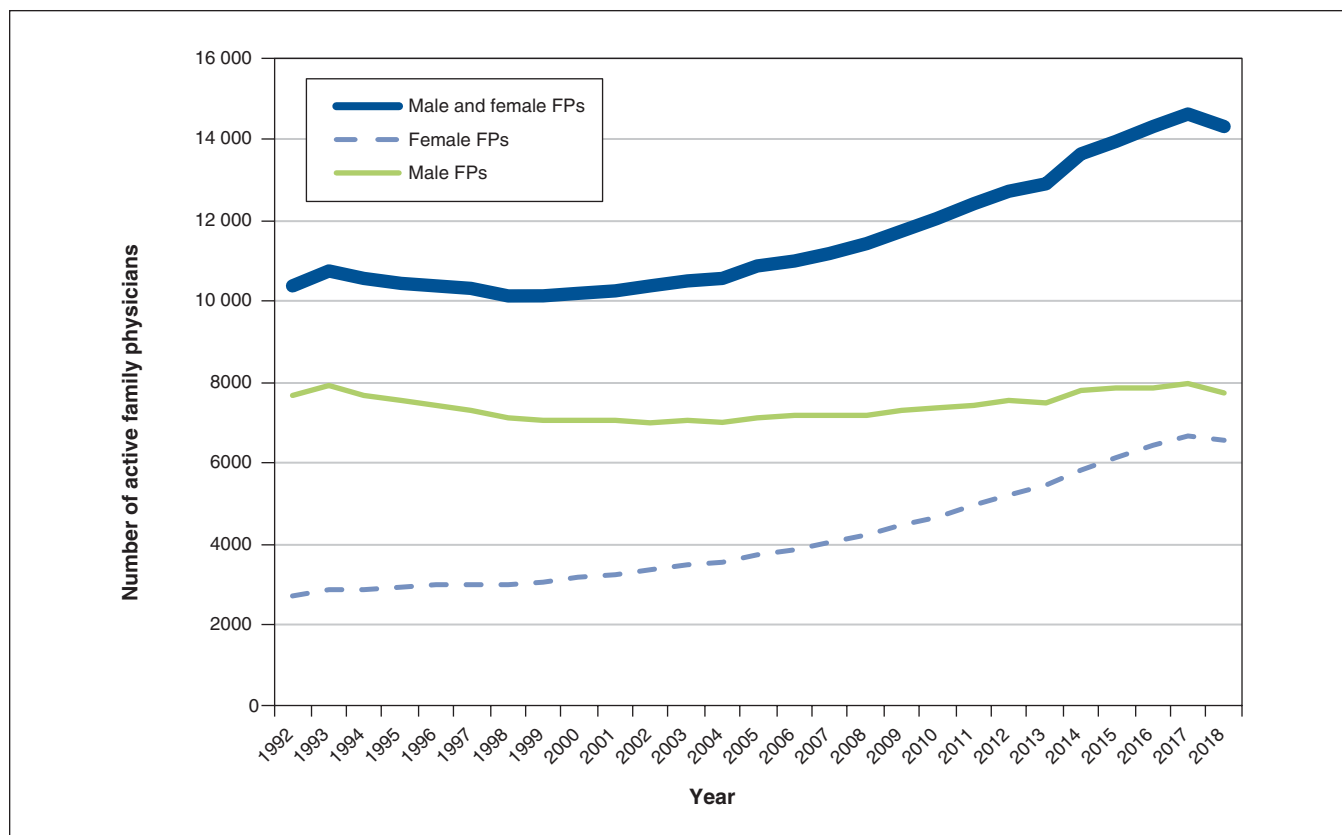
### Changes in FTE

Among male FPs, 32.7% worked less than 1 FTE, 18.1% worked 1 FTE and 49.2% worked more than 1 FTE. The percentage of male FPs who worked less than 1 FTE and 1 FTE was stable over the 27-year study period (Figure 2), while the percentage of those who worked more than 1 FTE increased 3.4% (47.3% in 1992 to 50.7% in 2018).

Among female FPs, the percentage who worked less than 1 FTE decreased 10.2% (from 58.6% in 1997 to 48.3% in 2015), while the percentage who worked more than 1 FTE increased 9.3% (from 18.7% in 1998 to 28.0% in 2017) (Figure 2). The percentage of those who worked 1 FTE remained relatively stable at 22.2%–24.3% over the 27 years. When looking at the absolute number of physicians in each year by sex and FTE (Appendix 1, Supplementary Figure 1, available at [www.cmajopen.ca/content/10/2/E420/suppl/DC1](http://www.cmajopen.ca/content/10/2/E420/suppl/DC1)), we observed similar trends, except among female FPs working less than 1 FTE or 1 FTE.

### Changes in age

Overall, female FPs were younger than male FPs by a median of about 7 years (median 44.9 v. 51.8 yr). When comparing age by FTE for each of the sexes, male FPs who worked less than 1 FTE were 1.8 years older (53.6 yr) than the overall median age, but those who worked 1 FTE (51.0 yr) or more than 1 FTE (50.4 yr) were a median of about 1 year younger. However, female FPs who worked less than 1 FTE (43.8 yr) were 1.1 years younger than the overall median for female FPs, while those who worked 1 FTE were similar to the overall median (45.4 yr) and those who worked more than 1 FTE were a median 1.6 years older (46.5 yr).



**Figure 1:** The number of active family physicians (FPs) in Ontario, Canada, from 1992 to 2018, by sex. There was a small decrease from 2017 to 2018. This was likely owing to our use of the ICES Physician Database, which had not been updated past 2017 at the time the data were provided to the study team.

**Table 1: Demographic characteristics of family physicians in Ontario, Canada, from 1992 to 2018**

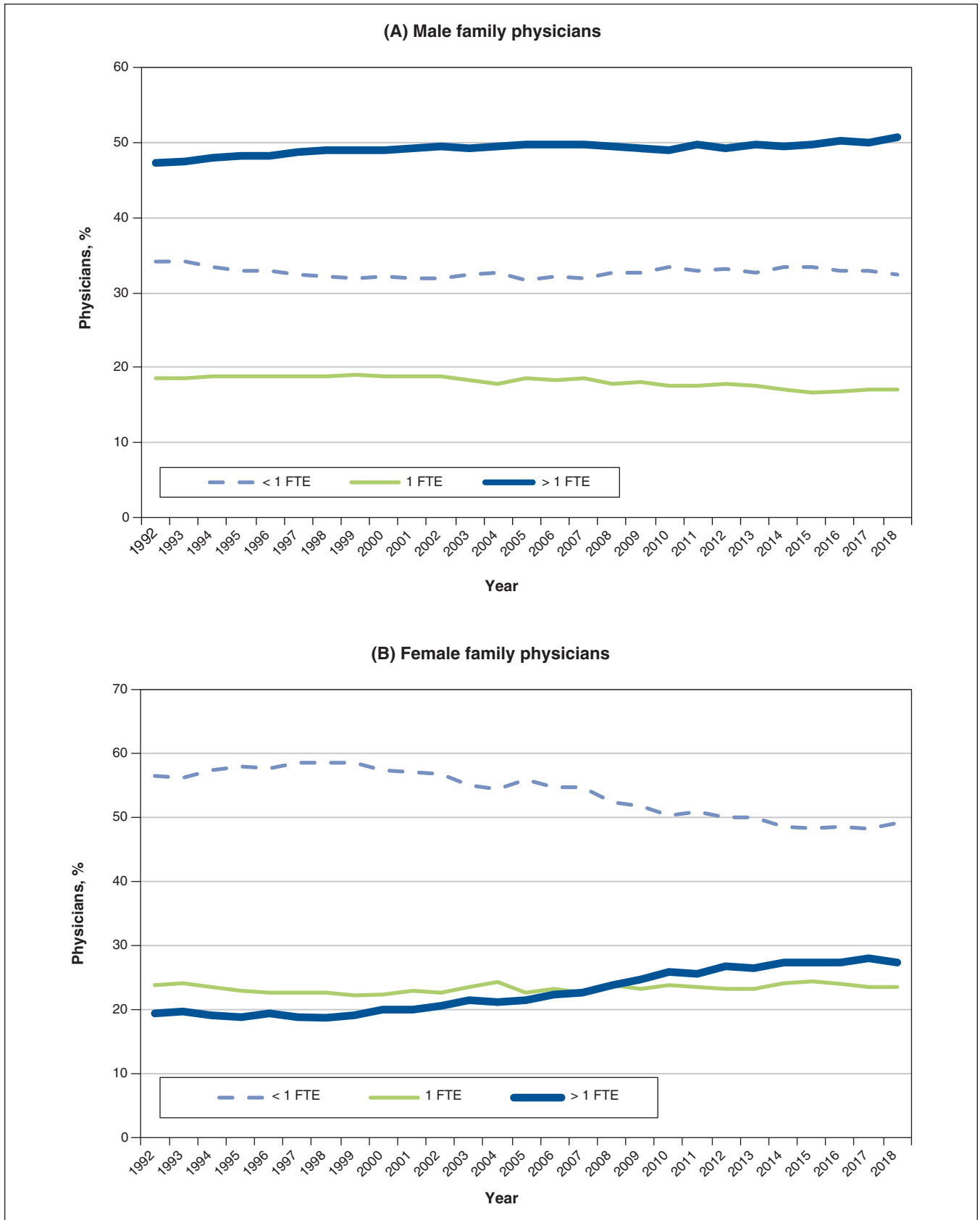
Characteristic	Mean ± SD	Median (IQR)	Range
<b>Overall</b>			
No. of physicians	11 631 ± 14 872	10 922 (10 441–14 748)	10 191–14 739
Age, yr	48.4 ± 2.33	49.4 (56.9–50.4)	43.6–50.8
Sex, female, %	35.3 ± 6.2	34.4 (29.8–40.8)	26.1–46.0
<b>Female FPs</b>			
No. of physicians	4 193 ± 1 289	3 759 (3 037–5 198)	2 722–6 710
Age, yr	43.9 ± 2.4	44.9 (42.2–46.0)	38.9–46.8
<b>Male FPs</b>			
No. of physicians	7 439 ± 3 09.0	7 377 (7 156–7 711)	7 094–8 029
Age, yr	50.9 ± 2.9	51.8 (48.9–53.5)	45.3–53.9

Note: FP = family physician, IQR = interquartile range, SD = standard deviation.

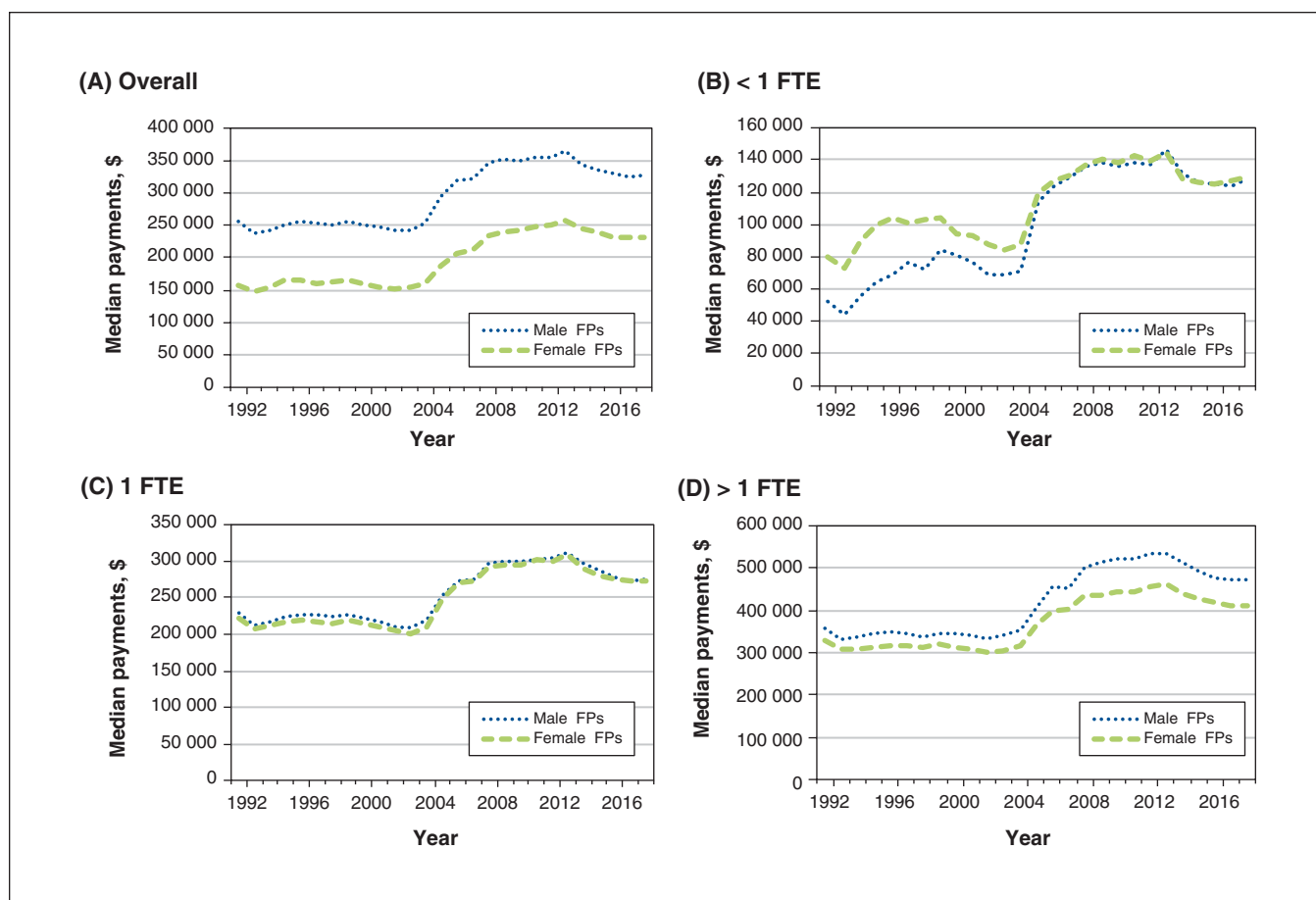
### Changes in payments

The yearly median payment by sex and FTE is shown in Figure 3 (mean payment in Appendix 2, Supplementary Figure 2, available at [www.cmajopen.ca/content/10/2/E420/suppl/DC1](http://www.cmajopen.ca/content/10/2/E420/suppl/DC1)). For both female and male FPs, median payments increased slightly from 1992 to 2003; from 2004 to 2013, the increase was larger (Figure 3A). Notably, in any

given year, the overall median payment was 40%–60% higher for male FPs than female FPs. However, for FPs working less than 1 FTE, female FPs had higher payments than male FPs from 1992 to 2004; from 2005 to 2018, the payments were similar between the sexes (Figure 3B). For those working 1 FTE, payments were similar between the sexes for the entire study period (Figure 3C). For those



**Figure 2:** The proportion of (A) male and (B) female family physicians (FPs) working less than 1, 1, or more than 1 full-time equivalents (FTEs) in Ontario from 1992 to 2018.



**Figure 3:** Median payment of family physicians (FPs) in Ontario, Canada, from 1992 to 2018 by year, sex and full-time equivalent (FTE). (A) Overall; (B) less than 1 FTE; (C) 1 FTE; (D) more than 1 FTE.

working more than 1 FTE, male FPs had 10%–20% higher payments than female FPs, and the payment gap increased from 2005 to 2018 (Figure 3D).

The proportion of FPs with more than 50% of their payments from fee-for-service is shown in Figure 4. In particular, among FPs who worked 1 FTE (Figure 4C), this proportion was similar between sexes from 1992 to 2004; after 2004, this proportion was higher in male FPs than female FPs, with an increasing gap for the period from 2005 to 2018.

### Clinical activity

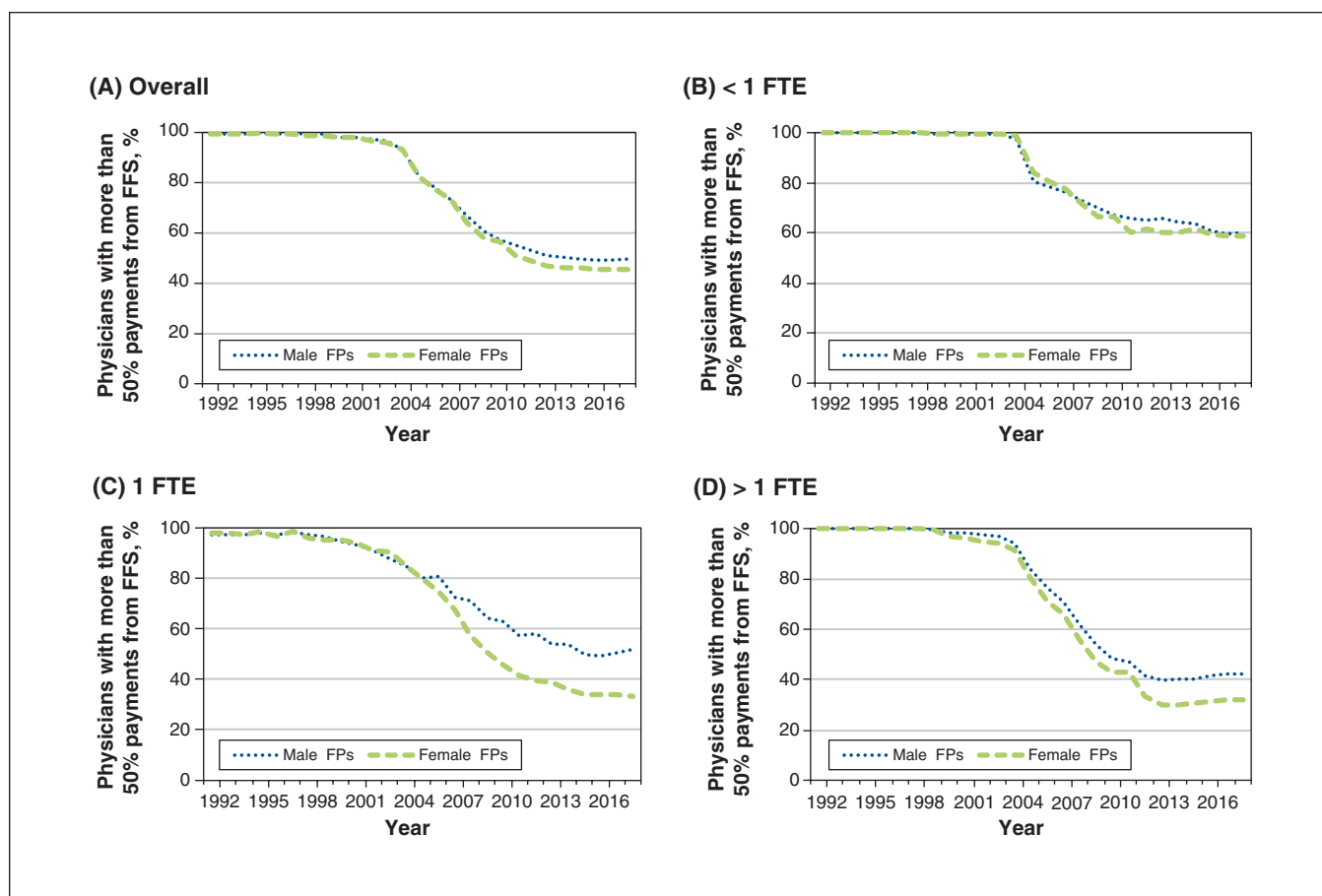
To compare female and male FPs with similar workloads, we focused on results of clinical activities for FPs working 1 FTE. Among these FPs, the yearly number of visits was lower for female FPs than male FPs by, on average, 428 fewer visits from 1992 to 2004, 663 fewer visits from 2005 to 2018 and 550 fewer visits for the entire study period 1992–2018 (Figure 5). The median number of unique patients seen by female and male FPs per year was similar from 1992 to 1999 and was 157 lower for female FPs than male FPs from 2000 to 2018 (Figure 5B). Overall, female FPs had 121 fewer patients per year for the entire study period. The yearly number of visits per patient was similar for both female and male FPs (Figure 5C).

### Multilevel regression analysis

When we controlled for the effects of covariates in the multilevel regression model (Table 2 and Figure 6), difference in payments by sex was smaller from 1992 to 2004, but gradually enlarged in recent years, particularly in 2013–2018 (Figure 6A and Appendix 3, Supplementary Figure 3, available at [www.cmajopen.ca/content/10/2/E420/suppl/DC1](http://www.cmajopen.ca/content/10/2/E420/suppl/DC1)). The results of the modelling indicate that the sex–year differences in payments were substantially reduced (although remained significant) after accounting for differences in the covariates. However, our observation that female FPs saw fewer patients and fewer visits than male FPs, seen in the univariate analyses (Figures 5A and 5B), still held true (Figures 6B and 6C). For number of visits per patient, female FPs consistently had a greater number than male FPs (Figure 6D). This is different from the results of the univariate analysis (Figure 5C).

### Interpretation

This study reports that from 1992 to 2018, the yearly change in Ontario FP supply was about 10 times greater for female FPs than male FPs. Despite the large increase in female FPs, their number still fell behind male FPs in 2018.



**Figure 4:** Proportion of family physicians (FPs) with more than 50% of their payment from fee-for-service (FFS) in Ontario by year and full-time equivalent (FTE). (A) Overall; (B) less than 1 FTE; (C) 1 FTE; (D) more than 1 FTE.

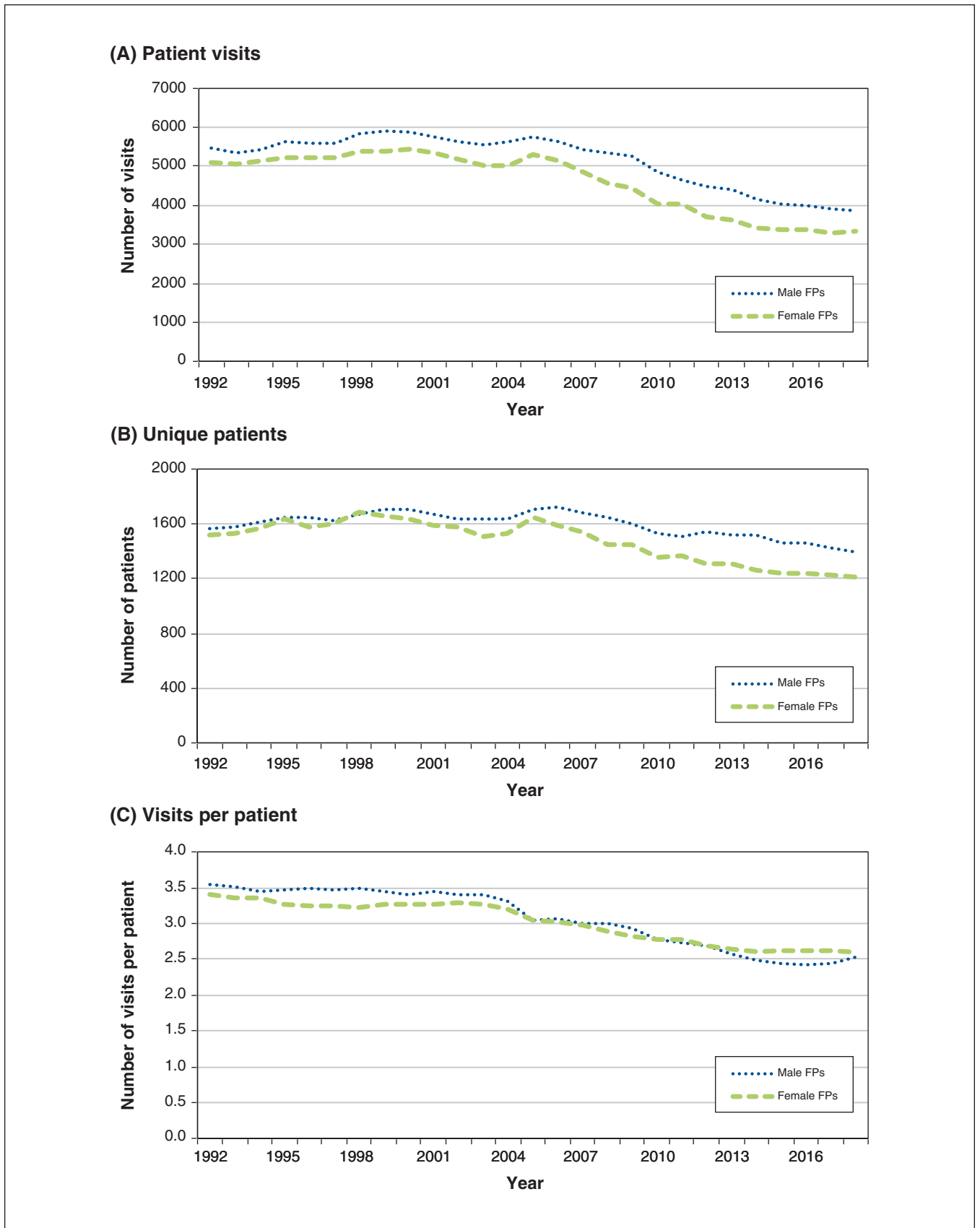
Female FPs seem to manage their practices in 3 distinctive ways, compared with male FPs. First, less than half of female FPs worked 1 FTE or more, compared with about two-thirds of male FPs. However, among female FPs, the proportion of those working more than 1 FTE has increased over time. This change suggests that, although the workload of female FPs, as measured by FTE, is less than that of male FPs overall, female FPs have gradually increased their clinical activities over time. Second, female FPs were less likely than male FPs to have payments from fee-for-service in recent years. Third, for FPs who worked 1 FTE, female FPs had fewer patients and fewer visits than male FPs.

Our finding that fewer female FPs worked 1 FTE or more are in accordance with existing studies that reported female physicians work fewer hours than male physicians.<sup>15–17</sup> Female FPs who worked less than 1 FTE were younger than the overall median age of female FPs. Thus, the lower proportion of female FPs working 1 FTE or more is most likely owing to competing demands related to child care and household management.<sup>15,16,18</sup> It was reported that 20% of female physicians spent 41 hours or more per week as the primary caregiver, compared with 6% of male physicians.<sup>18</sup> Female physicians with children spent on average 8.5 more hours per week on household activities and child care than male physicians.<sup>16,19,20</sup>

These social norm data suggest that, on average, many families and societies rely on the contributions of women. It is interesting that the female FPs who worked more than 1 FTE tended to be older (median age 46.5 yr), suggesting that as children age, female FPs may have more time for their careers.

Clinically, female physicians are perceived to be more empathetic, associated with a range of higher quality-of-care indicators (e.g., delivering more preventive services, fewer emergency department visits among their patients), and are preferred by both female and male patients to be their care providers.<sup>21–26</sup> However, given their family and household roles and responsibilities, it is unrealistic to expect female physicians to maintain the same clinical workload as their male counterparts, unless female physicians with families have strong support systems (of course, male physicians should have strong support systems too). Otherwise, female physicians may have to sacrifice their personal and family life, as has been reported among female physicians with significantly higher rates of not having children, divorce or never having been married than male physicians.<sup>27–29</sup>

Physician payments and clinical activities are directly correlated. More patient services typically translates into increased payments. As more male FPs worked at least 1 FTE



**Figure 5:** (A) Median number of visits, (B) median number of patients and (C) median number of visits per patient for family physicians (FPs) who worked 1 full-time equivalent (FTE) in Ontario, Canada, by year and sex.



**Table 2: Model outputs from multilevel regression analysis**

Variable	Payments, \$			No. of patients			No. of visits			No. of visits per patient		
	Estimate	SE	p value	Estimate	SE	p value	Estimate	SE	p value	Estimate	SE	p value
Female FPs v. male FPs*	-11 021.0	1721.4	< 0.0001	-494.4	18.0	< 0.0001	-986.1	36.0	< 0.0001	0.4	0.0	< 0.0001
Increase per year in male FPs												
1992–2004	140.8	82.4	0.0876	27.7	0.8	< 0.0001	-2.7	1.6	0.0964	0.0	0.0	< 0.0001
2005–2013	18730.0	99.7	< 0.0001	-40.7	0.9	< 0.0001	-166.8	2.0	< 0.0001	0.0	0.0	< 0.0001
2014–2018	-9785.6	210.1	< 0.0001	-24.4	1.8	< 0.0001	-96.1	4.1	< 0.0001	-0.1	0.0	< 0.0001
Differences in slopes (increase per year) for female FPs v. male FPs												
1992–2004	-10.1	133.4	0.9395	-0.5	1.1	0.6622	16.3	2.6	< 0.0001	0.0	0.0	0.6022
2005–2013	-5300.3	152.8	< 0.0001	17.7	1.3	< 0.0001	50.5	2.9	< 0.0001	0.0	0.0	0.3173
2014–2018	4866.0	318.6	< 0.0001	8.4	2.7	< 0.0001	37.8	6.1	< 0.0001	0.0	0.0	0.2625
Age, yr†	550.1	41.5	< 0.0001	-22.4	0.5	< 0.0001	-4.2	0.9	< 0.0001	0.1	0.0	< 0.0001
No. of visits†	28.5	0.1	< 0.0001	–	–	–	–	–	–	–	–	–
No. of patients†	7.2	0.3	< 0.0001	–	–	–	–	–	–	–	–	–
No. of visits per patient†	1136.1	96.8	< 0.0001	–	–	–	–	–	–	–	–	–
FTE†	–	–	–	1458.8	5.1	< 0.0001	5229.7	11.4	< 0.0001	1.4	0.0	< 0.0001

Note: FP = family physician, FTE = full-time equivalent, SE = standard error.

\*This is the difference when all covariates are set to their overall means and should not be interpreted as female FPs having \$11 021 less earnings than male FPs.

†Variables centred at their overall means.

than female FPs, their overall payment would be expected to be higher. We observed that the gap in payments by sex no longer existed among FPs who worked less than 1 FTE (for more recent years) or 1 FTE, indicating that the overall higher payments for male FPs may be attributable to a higher proportion of those who worked more than 1 FTE, with correspondingly higher payment. It has long been believed that the fee-for-service model favours specialty groups that perform procedures, rather than those who provide consulting services, such as FPs.<sup>12</sup> In Ontario, before 2000, most female and male FPs were paid through fee-for-service.<sup>12,13</sup> By 2010, more than two-thirds of FPs received payments through alternative, non-fee-for-service payment models.<sup>12</sup> Our results showed that the proportion with FPs who worked 1 FTE who received more than 50% of their payment from fee-for-service was lower among female FPs (35% in recent years) than male FPs (50%). One potential explanation is that alternate payment plans are most common in team-based practice. Female FPs may prefer team-based rather than solo practice, as shown in studies of FP practice patterns in Canada and the United States, owing to a more collaborative and interactive approach, increased flexibility and reduced administrative responsibility.<sup>1,5,28,30,31</sup> Another possible explanation is that FPs who have practices that focus on specific aspects of care (e.g., sports medicine, palliative care) remain in fee-for-service, and more male FPs provide these specific types of care.<sup>32,33</sup>

When both female and male FPs work at the same 1 FTE level, we found female FPs had significantly fewer patient visits

and fewer distinct patients than male FPs. When the confounding effects of age and FTE were controlled for in multilevel regression analyses, female FPs had more visits per patient than male FPs (Figure 6D). These findings are consistent with reports that female FPs spend more time with their patients and have a tendency to provide continuity of care.<sup>34–36</sup>

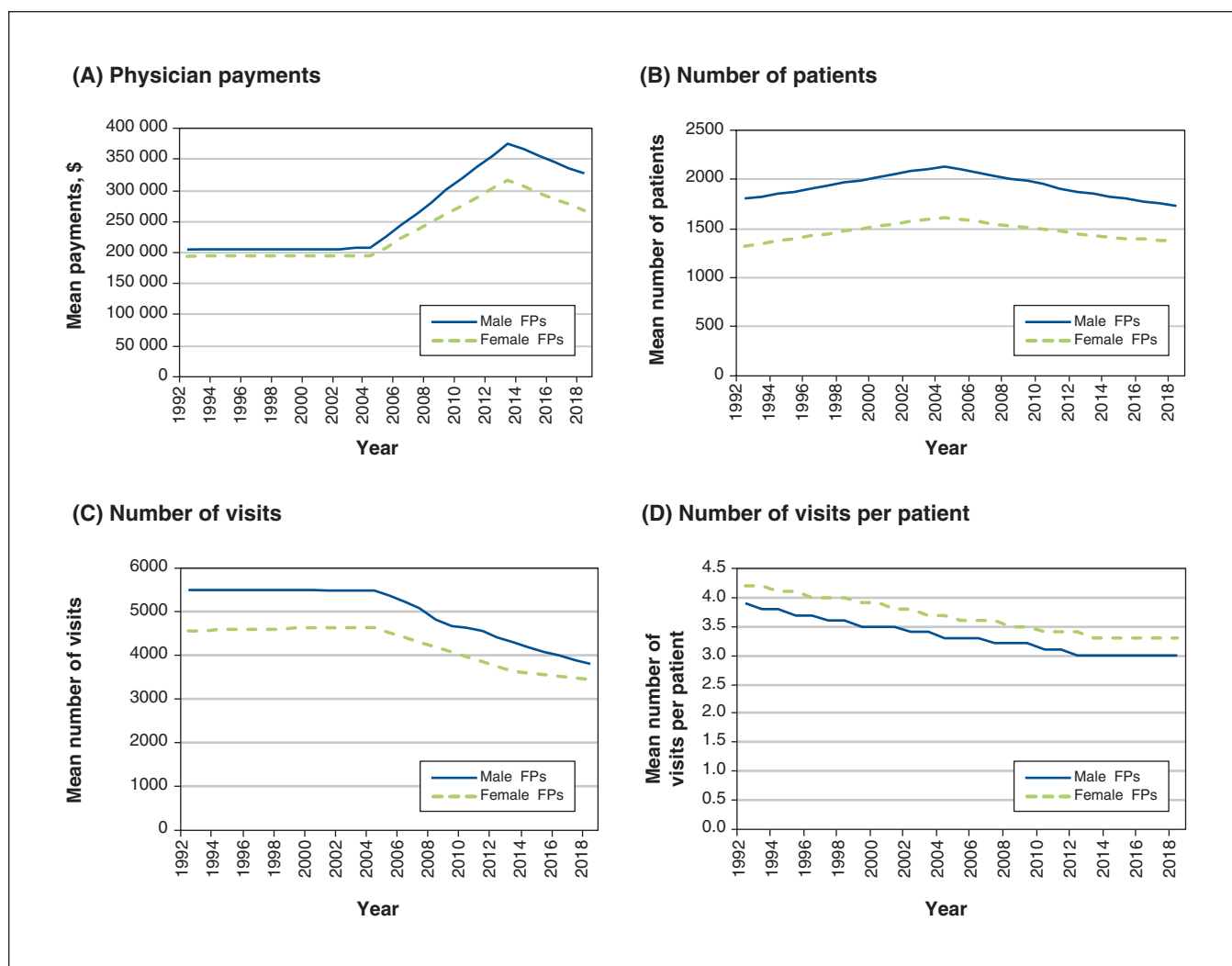
### Limitations

In OHIP, billings do not include uninsured services, worker's compensation claims, third-party payers, leadership roles and research funding. Similarly, the 5%–10% of physicians who are salaried and under alternative payment plans were not included.<sup>14</sup> Data analyzed were from Ontario, covering the years 1992–2018. Results may not be reflective of other jurisdictions or time periods.

We measured physician workload through the distribution of total payments, not working hours, and reported quantity, not quality, of clinical activities. Furthermore, we used normal-based regression models for variables that, strictly speaking, may not meet model assumptions, including normal distribution and equal variance. However, given our large sample size, it is likely that the sampling distributions approximate the normal distribution and the overall conclusions are robust.

Finally, this study focused only on biological females and males, and did not consider gender and other characteristics, including family size, geographic location, socioeconomic status, ethnicity, immigration status and disabilities, which are not available in the data set. Future studies with direct





**Figure 6:** Predicted values from multilevel regression models. Models for (A) payment included sex, year, sex–year interaction, physician age, number of patient visits, number of distinct patients seen and number of visits per patient. Models for (B) patients, (C) visits and (D) visits per patient included sex, year, sex–year interaction, physician age and physician full-time equivalent. Values were estimated with variables at their mean. Note: FP = family physician.

measures of physician working hours and qualitative assessment of clinical activities between sexes are needed.

**Conclusion**

The FP supply in Ontario has increased in recent decades, dominated by an increase in female FPs. Despite this, the number of female FPs still fell behind male FPs in 2018. Compared with male FPs, female FPs had lower OHIP payments (overall and among those who worked more than 1 FTE), were proportionately more likely to work less than 1 FTE and were less likely to work 1 or more FTE; however, this gap has decreased over time. In the 1 FTE group, female FPs were less likely to receive payment from fee-for-service, had fewer patients and fewer visits. Health administrators should be mindful of the changing demographic of FPs and of the distinctive features of female and male FPs in their clinical activities. Further studies into the determinants of these differences are warranted.

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- Contributors:** All authors contributed to the concept and design of the study, and data collection. Mayilee Canizares analyzed the data, and all authors contributed to data interpretation. All of the authors drafted the manuscript, revised it critically for important intellectual content, gave final approval of the version to be published and agreed to be accountable for all aspects of the work.
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- Data sharing:** The data set from this study is held securely in coded form at ICES. Although data sharing agreements prohibit ICES from making the data set publicly available, access may be granted to those who meet prespecified criteria for confidential access, available at <https://www.ices.on.ca/DAS>. The full data set creation plan and underlying analytic code are available from the authors upon request, understanding that the computer programs may rely upon coding templates or macros that are unique to ICES and are therefore either inaccessible or may require modification.
- Disclaimer:** This study contracted ICES Data & Analytic Services and used deidentified data from the ICES Data Repository, which is managed by ICES with support from its funders and partners: Canada's Strategy for Patient-Oriented Research (SPOR), the Ontario SPOR Support Unit, the Canadian Institutes of Health Research and the Government of Ontario. ICES is funded by an annual grant from the Ontario Ministry of Health. The opinions, results and conclusions reported are those of the authors. No endorsement by ICES or any of its funders or partners is intended or should be inferred.
- Supplemental information:** For reviewer comments and the original submission of this manuscript, please see [www.cmajopen.ca/content/10/2/E420/suppl/DC1](http://www.cmajopen.ca/content/10/2/E420/suppl/DC1).