ORIGINAL RESEARCH

Physician and Practice Characteristics Associated with Family Physician Panel Size

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Purpose: **Understanding primary care panel sizes is crucial as US policy makers and workforce planners wrestle with both primary care shortage and rising clinician burnout. We aimed to investigate physician and practice factors associated with variation in panel size.**

Methods: **We analyzed data from the 2017 to 2023 American Board of Family Medicine (ABFM) Family Medicine Continuing Certification Questionnaire. The nationally-representative, mandatory (100% response rate) questionnaire included demographic, practice, and panel size data for family physicians (FPs). Bivariate analyses and generalized linear models with a log-linked γ distribution examined associations between panel size and physician, practice, and area characteristics.**

Results: **21,770 FP respondents reported estimated panel size averaging 1,933 patients/FP. On adjusted analyses, FPs in independently owned practices reported the largest panel sizes, while those in academic practices and federal clinics had the smallest panel sizes. FPs working in practices of 2 to 5 physicians had larger panel sizes than those in solo or larger group practices. FPs providing obstetric and inpatient care had smaller panel sizes than their counterparts. Working with nurse practitioners or physician assistants was associated with larger panel sizes. A greater proportion of vulnerable patients in a practice was associated with smaller panel sizes. Panel size decreased over time after adjusting for other predictors.**

Conclusions: **Panel sizes among FPs vary significantly based on practice type and size, team composition, and scope of practice. These findings highlight the importance of considering both individual and practice-level factors in workforce planning and policy development to optimize primary care delivery and manage physician workloads effectively. (J Am Board Fam Med 2025;38:846–854.)**

Keywords: **Access to Care, Family Medicine, Family Physicians, Health Policy, Linear Models, Panel Size, Primary Health Care, Surveys and Questionnaires, Workforce, Workload**

Maintaining relationships between patients and physicians is a cornerstone of primary care, and the ability of a physician to build and sustain these relationships hinges on patient panel size. A patient panel is a group of patients assigned to one specific physician or clinical team, with empanelment referring to the act of creating that linkage.[1] Successful empanelment can be challenging due to patient turnover and other factors, but is[2] critical for supporting core primary care functions such as care coordination, registry-based chronic disease management and overall population health management,[3] maintaining staffing balance, and determining resource needs for high-quality care.[4]

Previous research has demonstrated an association between panel sizes and a variety of outcomes. Many studies have found that smaller panel sizes are associated with better quality of care,[5–7] including better diabetes care, higher rates of pneumococcal vaccination and screening for alcohol misuse,[8] higher health promotion scores,[9,10] and better overall preventative care.[10,11] Several studies have suggested that larger panel sizes are associated with worse access, such as longer waiting times for appointments.[8,12–16] Some studies have found that smaller panel sizes were associated with greater continuity of care,[17,18] though

This article was externally peer reviewed.
Submitted 19 February 2025; revised 23 April 2025; accepted 12 May 2025.
From The American Board of Family Medicine, Lexington, KY (AB, ZJM); Center for Professionalism & Value in Health Care, Washington, DC (AB); University of California San Francisco, College Park, MD (KG).
Funding: None.
Conflict of interest: The authors have no conflict of interest, financial or other, that exists.
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one study found a U-shaped relationship between continuity and panel size, with continuity best achieved in midrange panel sizes.[5] Among Medicare beneficiaries, smaller patient panel sizes have been associated with less low-value spending.[19] Another study found that primary care physicians with smaller panel sizes had a higher percentage of their patient's emergency department visits be due to emergencies rather than for needs which could have been met by primary care.[20]

Unlike literature on panel size and outcomes, there remains a paucity of published research on predictors of panel size, such as physician and practice characteristics. Newer practices have smaller panel sizes, while more support staff and more examination rooms are associated with larger panel sizes.[21] Average panel sizes have been found to be larger for male physicians and international medical graduates and physicians practicing in urban settings.[4] The lack of more information about the factors influencing panel size leaves a knowledge gap for workforce planners, health education leaders and policy makers, as panel size per clinician is a critical supply-side assumption for workforce assessments. Understanding how recent seismic shifts in primary care organization and delivery, such as more physicians working as employees of hospital and corporate health systems, may affect panel size is of particular importance.

We conducted a study to investigate how panel sizes reported by a nationally representative sample of family physicians might differ according to physician, practice, and contextual factors. In a previous study using the same data source, we reported that mean panel size decreased by 25% between 2013 and 2022.[22] In this cross-sectional study, we pooled data from 2017 to 2023 to explore hypotheses such as: (1) physicians working as employees in larger organizations, particularly hospital-owned systems, will have larger panel sizes due to less individual physician autonomy and greater organizational demands for productivity; (2) physicians caring for patients with higher social needs will have smaller panel sizes due to the complexity of their panels; (3) physicians in rural areas will have larger panels due to lower primary care physician supply; (4) physicians working with Advanced Practice Providers (APPs) will have larger panels due to greater team capacity and care sharing; and (5) physicians providing obstetric and inpatient medical care will have smaller panels due to reduced time available for ambulatory care.

Methods

We used data from the 2017 to 2023 American Board of Family Medicine (ABFM) Family Medicine Continuing Certification Questionnaire of practicing physicians seeking to continue board certification.[23] The questionnaire is a mandatory component of examination registration and is completed 3 to 4 months before the examination date. It is typically first completed 7 to 10 years after residency training, and repeated every 7 to 10 years to maintain certification. The questionnaire asks about practice type and ownership, scope of practice, and practice features and is linked to administrative data on physician demographic and training characteristics. Since 2013, it has also asked physicians to estimate the size of their patient panel, with an available option to report that they are unable to provide an estimate. We restricted our sample to US based family physicians who reported practicing continuity care and excluded those with missing or invalid address or demographic data.

Our independent variables included year as well as physician, area, and practice characteristics. Physician characteristics included age, gender, medical training, years in practice, and hours worked in total and in patient care and administrative tasks. Area characteristics based on location of the practice linked to the Area Health Resource File included census region, county-level urban-rurality designation, social deprivation index, and percent of households under the poverty level.[24–26] Practice characteristics included practice type, size, ownership, and nurse practitioner (NP) or physician assistant (PA) presence on care team. Scope of practice characteristics included provision of obstetric care, adult inpatient care, and the ABFM's iSOP scope of practice score.[27] iSOP scores were categorized into low, medium, and high scope of practice, with approximately one-third of respondents falling into each category.

We organized diplomate self-reported practice type into categories. We combined responses for federally qualified health center (FQHC), Rural Health Clinic, Indian Health Service, and nonfederal government clinic, into an "Community Clinics" category. We kept existing response options for independently owned medical practice, hospital-owned, academic health center, federal (military, Veterans Administration/Department of Defense), and health maintenance organization. Finally, we combined "workplace clinic" and "other" into a "miscellaneous"

category. Practice ownership options included: "no ownership," "partial owner," "sole owner," "self-employed," and "other"; we combined "self-employed" and "other" into a single category labeled "other."

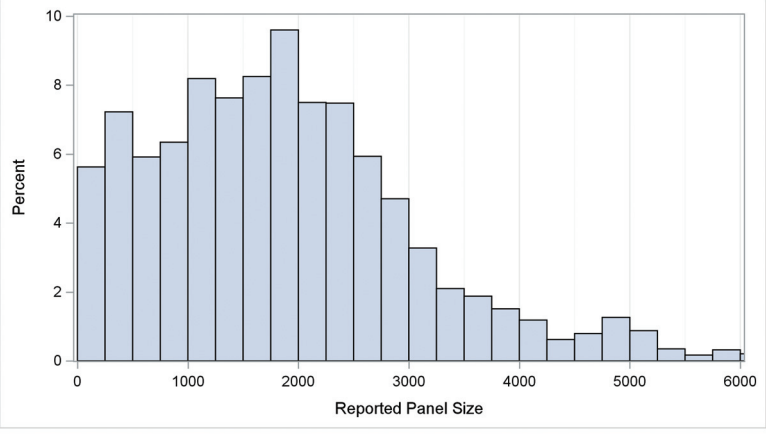
To investigate associations between independent variables and panel size, we first used a combination of *t* test, ANOVA F-tests, and Spearman Correlation tests to explore bivariate relationships. We then used a generalized linear model with a log-linked γ distribution to estimate adjusted associations with panel size. Some variables were omitted from the regression because of collinearities with other covariates in the model. Due to the log link function, the extracted effect estimates quantify the percentage change in panel size associated with the levels of each independent variable relative to the reference value. To assess the potential impact of outliers, we also performed a sensitivity analysis, rerunning the regression excluding respondents who reported panel sizes of <100 or >5,000.

Results

In 2017 to 2023, 51,296 unique family physicians completed the ABFM Family Medicine Continuing Certification Questionnaire. Of the 35,750 who met the inclusion criteria, 21,770 provided estimates of panel size. The distribution of panel size (Figure 1) had a mean of 1,933 patients and considerable variation (standard deviation = 1,330).

Bivariate tests revealed significant associations between panel size and all independent variables except for medical training (Tables 1–2). Many of these associations remained significant after regression adjustment (Table 3). The decline in panel size over time as previously reported persisted after adjustment for other predictors, with an estimated 1.7% per year decrease.[22] For physician characteristics, those aged 50 to 59 (+6.5% panel vs 40 to 49 reference), international medical graduates (+6.2% vs MD non-international medical graduates [IMG]), DOs (+4.4% vs MD non-IMG), and those with more hours in patient care (+5.5% for each 5 hour increase) had larger panel sizes while Female respondents (−10.6% vs Male) and those with more administrative hours (−0.3% for 1 hour increase) had smaller panels. Those practicing in the Northeast (−11.7% vs South) or West (−9.3% vs South), and those reporting more than 50% vulnerable patients at their practice (−20.5% vs <10) had smaller panels. For practice characteristics, panel size was highest for respondents practicing in independently owned practices, with panel size second highest among those working in hospital/system owned practices (+6.6% in independent practices vs hospital/system owned). Panel sizes were modestly smaller at respondents working at managed care/HMO practices than in hospital/system owned practices (−4.5%), and substantially smaller in those working at community clinics (−19.9%) and particularly in academic health centers (−43.7%) or federal (−43.4%) practices relative to sizes in hospital/system owned practices. (Ownership was collinear with practice type and could not simultaneously be included in the regression model.) Practice size had an inverted-U shaped relationship, with

Figure 1. Distribution of family physician reported panel size, 2017 to 2023.



Note: * Values have been adjusted slightly to reduce clustering and smooth distribution patterns

Table 1. Characteristics of Family Physicians, by Reported Panel Size, 2017–2023

	Total		Panel Size		
	N	Column Percent	Mean	SD	*P*-value
Total	21,770	100.0%	1,933.1	1,330.1	<0.0001
Age					
Under 40	2,334	10.7%	1,731.0	1,143.4	
40 to 49	8,425	38.7%	1,841.6	1,251.3	
50 to 59	6,609	30.4%	2,051.4	1,403.0	
60+	4,402	20.2%	2,037.8	1,427.0	
Gender[†]					
Female	9,567	43.9%	1,687.5	1,153.6	<0.0001
Male	12,128	55.7%	2,128.5	1,425.8	
Medical background					
MD, Non-IMG	15,062	69.2%	1,929.4	1,325.2	0.0928
MD, IMG	4,227	19.4%	1,915.3	1,349.4	
DO, Non-IMG	2,481	11.4%	1,985.7	1,326.3	
Years in practice					
0 to 10	6,941	31.9%	1,732.0	1,162.1	<0.0001
11 to 20	6,425	29.5%	1,939.2	1,327.5	
21 to 30	5,612	25.8%	2,121.8	1,429.4	
31+	2,792	12.8%	2,039.6	1,447.2	
Total hours*					
<40	4,930	22.6%	1,527.9	1,107.1	<0.0001
40 to 55	11,097	51.0%	1,971.4	1,271.5	
>55	5,743	26.4%	2,207.0	1,520.7	
Patient care hours*					
<25	5,147	23.6%	1,155.4	974.5	<0.0001
25 to 40	13,253	60.9%	2,112.5	1,254.5	
>40	3,370	15.5%	2,415.2	1,583.7	
Admin hours*					
<5	5,905	27.10%	1,882.10	1,293.90	<0.0001
5 to 10	8,442	38.8%	2,009.5	1,341.6	
>10	7,423	34.1%	1,886.8	1,341.5	
Rurality of County (from RUCC)					
Metro	18,703	85.9%	1,916.3	1,321.0	<0.0001
Non-metro	3,067	14.1%	2,035.2	1,380.6	
Region					
Northeast	3,087	14.2%	1,787.2	1,297.1	<0.0001
Midwest	5,348	24.6%	2,098.1	1,312.8	
South	6,770	31.1%	2,055.6	1,500.8	
West	6,565	30.2%	1,740.9	1,124.8	
Percent of County in Poverty*					
<15	17,074	78.4%	1,938.5	1,299.4	<0.0001
15+	4,696	21.6%	1,913.4	1,436.2	
Social Deprivation Index*					
<75	17,613	80.9%	1,951.8	1,313.4	<0.0001
75+	4,157	19.1%	1,853.7	1,396.1	
Vulnerable Patients					
<10%	8,624	39.6%	2,131.2	1,352.9	<0.0001
10 to 49%	9,148	42.0%	1,986.9	1,284.4	
>50%	3,998	18.4%	1,382.6	1,231.7	

*Included in statistical tests and analysis as numeric variable.
[†]Values for "Non-binary," "Prefer to self-describe," "Prefer not to answer" not shown and excluded from statistical tests.

Table 2. Average Panel Size by Practice Characteristics and Scope of Practice, 2017–2023

	Total		Panel Size		
	N	Column Percent	Mean	SD	*P*-value
Total	35,750	100.0%	1,933.1	1,330.1	
Practice type					
Hospital/health system owned medical practice	12,725	35.6%	2,151.4	1,153.7	<0.0001
Independently owned medical practice	10,768	30.1%	2,295.5	1,622.4	
Managed care/HMO practice	2,201	6.2%	1,793.8	801.1	
Academic health center/faculty practice	2,693	7.5%	933.9	878.7	
Federal (Military, Veterans Administration/Department of Defense)	1,329	3.7%	1,089.2	615.0	
Publicly Owned, FQHC, Other Public	4,142	11.6%	1,462.1	1,113.5	
Miscellaneous	1,892	5.3%	1,393.6	1,301.6	
Site size					
Solo practice	3,725	10.4%	1,956.4	1,638.2	<0.0001
2 to 5 providers	11,870	33.2%	2,142.6	1,479.7	
6 to 20 providers	11,355	31.8%	1,887.5	1,178.2	
>20 providers	8,800	24.6%	1724.6	1,124.4	
Site owner					
Sole owner	4,242	11.9%	2,327.4	18,51.7	<0.0001
Partial owner or shareholder	6,114	17.1%	2,298.1	1,224.6	
No official ownership stake	23,886	66.8%	1,763.9	1,196.0	
Other	1,508	4.2%	1,621.1	1,360.4	
Practice team members					
NP	9,914	27.7%	1,982.5	1,357.7	<0.0001
PA	4,569	12.8%	21,56.2	1,389.3	
Both NP + PA	11,172	31.3%	1,892.4	1,254.9	
Neither NP nor PA	10,095	28.2%	1,822.4	1,344.5	
Provides OB					
Yes	2,558	7.2%	1,581.9	1,312.8	<0.0001
No	33,192	92.8%	1,960.6	1,327.6	
Provides adult inpatient care					
Yes	7,075	19.8%	1,746.8	1,499.5	<0.0001
No	28,675	80.2%	1973.0	1,287.5	
Scope score					
Low scope	11,313	31.6%	1721.0	1,243.5	<0.0001
Medium scope	13,412	37.5%	2085.2	1,310.0	
High scope	11,025	30.8%	1947.6	1,400.8	

Abbreviations: FQHC, Federally Qualified Health Center; HMO, Health Maintenance Organization; NP, Nurse Practitioner; OB, Obstetrics; PA, Physician Associate.

panel size higher in settings with 2 to 5 physicians than in solo practices or larger group practices. Respondents working with either NPs, PAs, or both (+13.0% vs neither) on their team had larger panels. Finally, those providing obstetric deliveries (−4.8% vs not providing) and adult inpatient care (−14.7% vs not providing), or those with a low scope score (−12.9% vs medium), had smaller panels. In our sensitivity analysis truncating outlier or seemingly implausible panel sizes, few borderline effects gained or lost significance, no effect changed direction, and the magnitude of effects and major findings were largely the same.

Discussion

This study is relatively unique in systematically characterizing factors associated with self-reported family physician panel size across a multiyear national survey sample. It reveals considerable variation in panel

Table 3. Adjusted Associations with Family Physician Panel Size, 2017–2023

	Estimated Change in Panel Size (95% CI)
Intercept	2409.3 (2317.1, 2505.1)
Years since 2017	
Effect of 1 year increase	−1.7% (−2.1%, −1.3%)
Age	
Under 40	−3.7% (−6.8%, −0.6%)
50 to 59	6.5% (4.1%, 8.9%)
60+	2.7% (−0.0%, 5.4%)
40 to 49	Reference
Gender	
Female	−10.6% (−12.3%, −8.8%)
Male	Reference
Medical training	
MD, IMG	6.2% (3.6%, 8.9%)
DO, Non-IMG	4.4% (1.3%, 7.5%)
MD, Non-IMG	Reference
Patient care hours	
Centered at 35, effect of 5 hour increase	5.5% (5.1%, 5.9%)
Admin hours	
Centered at 10, effect of 1 hour increase	−0.3% (−0.4%, −0.2%)
Rurality of County (from RUCC)	
Non-metro	0.3% (−2.6%, 3.2%)
Metro	Reference
Region	
Northeast	−11.7% (−14.4%, −9.0%)
Midwest	0.6% (−2.0%, 3.3%)
West	−9.3% (−11.6%, −7.0%)
South	Reference
Social deprivation index	
Centered at 50, effect of 10 unit increase	0.7% (0.3%, 1.1%)
Vulnerable patients	
10 to 49%	−2.6% (−4.6%, −0.5%)
>50%	−20.5% (−22.9%, −18.1%)
<10%	Reference
Practice type	
Independently owned medical practice	6.6% (4.0%, 9.3%)
Managed care/HMO practice	−4.5% (−8.3%, −0.6%)
Academic health center/ faculty practice	−43.7% (−46.0%, −41.2%)
Federal (Military, Veterans Administration/ Department of Defense)	−43.4% (−46.0%, −40.7%)
Community clinic (e.g. FQHC)	−19.9% (−22.8%, −16.9%)
Miscellaneous	−27.3% (−30.9%, −23.5%)
Hospital/health system owned medical practice	Reference
Site size	
Solo practice	−12.6% (−15.7%, −9.4%)
6 to 20 providers	−2.4% (−4.7%, −0.0%)
>20 providers	−5.1% (−7.7%, −2.5%)
2 to 5 providers	Reference
Practice team members	
NP	10.1% (7.2%, 13.0%)
PA	17.4% (13.7%, 21.3%)
Both NP + PA	13.0% (10.0%, 16.1%)
Neither NP nor PA	Reference
Provides OB	
Yes	−4.8% (−8.5%, −0.9%)
No	Reference
Provides adult inpatient care	
Yes	−14.7% (−17.0%, −12.2%)
No	Reference
Scope score	
Low scope	−12.9% (−15.0%, −10.8%)
High scope	1.4% (−1.1%, 4.0%)
Medium scope	Reference

Abbreviations: DO, Doctor of Osteopathy; FQHC, Federally Qualified Health Center; HMO, Health Maintenance Organization; IMG, International Medical Graduate; MD, Medical Doctor; RUCC, Rural to Urban Commuting Codes.

size among family physicians even after adjusting for hours worked in patient care and demonstrates that many physician, area, and practice-level factors are independently associated with panel size. Practice type was the strongest independent predictor of panel size. Contrary to our hypothesis that family physicians working as employees in hospital- and health system-owned practices would have the largest panel sizes due to organizational demands for productivity, we found that family physicians in independently owned practices reported the largest panel sizes, although panel sizes among the hospital- and health system-owned practices were larger than panel sizes for family physicians in all practice types other than independently owned. Practice size was another independent predictor, with panel sizes highest among small physician groups. These findings suggest that the autonomy and economic incentives of independent practice ownership may motivate physicians to optimize their productivity and total patient loads, highlighting the role of small, physician-owned group practices in maximizing

primary care capacity amid a national primary care access crisis.[28] In view of some prior studies finding that larger panel sizes are associated with lower quality of care, future research should carefully assess whether this association may differ depending on practice context. A recent study found that physician-owned primary care practices were more likely than hospital or health system-owned practices to achieve improvements in quality of care without increasing clinician burnout, adding support for the notion that independent practice may foster an environment in which physicians feel more self-agency in striving for high productivity and quality of care.[29]

Consistent with our hypothesis, family physicians with a greater proportion of vulnerable patients in their practices reported smaller panel sizes. Although this finding may contribute to the substantially lower panel sizes reported by physicians working in community clinics, federal clinics, and academic practices, the lower panel sizes in these settings persisted even after adjusting for self-reported proportion of vulnerable patients in the respondent's practice. This merits further investigation to understand whether this variation across practice types may in part be due to the uncaptured elements of higher complexity of patients cared for in some settings or other factors. The Veterans Health Administration (VHA) has established a standard panel size of 1,200 for a full-time primary care physician, consistent with the lower panel sizes reported by respondents working in federal clinics.[30] This policy reflects the willingness of the VHA to invest the resources in clinician and team staffing needed to deliver comprehensive primary care to a high need population. In terms of geography, despite the potentially greater patient demands in rural areas due to lower supply per capita of primary care physicians than in urban communities, we did not find that panel sizes were larger among rural respondents. It remains possible that using more granular definitions of degree of rurality could detect higher panel sizes in remote rural areas.

Physicians providing obstetric and inpatient care reported smaller panel sizes, consistent with our hypothesis that engaging in these additional activities outside of the ambulatory setting reduce the time available for outpatient care. The finding that lower overall scope (iSOP) scores were associated with smaller panel sizes was more surprising, perhaps reflective of patient complexities and depth of care not captured in that scale and would benefit from additional qualitative investigation to better understand the underlying factors. Consistent with our hypothesis, respondents working with NPs and PAs had larger panel sizes. Although several studies have modeled the imputed benefit of team care models for managing a larger panel size, our finding is one of the few empirical studies to demonstrate an association between interprofessional staffing of practices and panel size.[31,32]

Our findings also confirm our previously reported descriptive study, which demonstrated a 25% decline over time in mean self-report panel size among FPs over the past decade.[22] After adjusting for the many other independent variables in our model, year remained a highly significant, negative predictor of panel size. Our adjusted analyses suggest that this decrease in panel size over time is unlikely to be explained by secular shifts in physician and practice characteristics, and rather reflects a tendency toward smaller panel sizes independent of changes in other predictors. This reduction in panel sizes over time may be a coping strategy among family physicians facing increasing patient complexity, administrative burden and high rates of burnout.[33–36]

Better understanding primary care panel size is critical in a time of simultaneous primary care access crisis and clinician burnout. Finding a 'right panel size' that meets patient, population and clinician needs remains far from an exact science, and depends on many assumptions about patient complexity, resources and team-configurations, visit frequency, and the degree to which a physician is required to offer same-day access for acute needs, chronic and preventive care, asynchronous care, and population health management.[12,21,37]

Our study adds new insights into the great variability in panel size among US family physicians and how this variation differs by many physician and practice characteristics. Advocates for larger panel sizes often cite the team-based approach mentioned above as a way to adequately care for larger panel sizes,[38] while those supporting smaller panel sizes note that Americans receive only roughly 50% of recommended acute, chronic, and preventive care services, partly because of lack of physician time.[17] The panel sizes reported by our respondents suggest that policy makers and planners must move away from unrealistic historic assumptions suggesting that Primary Care Physicians (PCPs) could care for 2,500 patients apiece—a benchmark much higher than the sizes reported by most respondents in our study and standards adopted by organizations such as the VHA.[17,39–41]

This study is not without limitations. While our data come from the nation's most comprehensive source of self-reported family physician information, many respondents were unable to report panel size, and we did not objectively validate the panel sizes that were reported. While self-reported panel size has not yet been objectively validated, prior work and our own findings show consistent patterns across physician and practice characteristics, supporting its value for understanding variation in primary care capacity.[41] We did not detect significant differences in physician and other characteristics between those reporting a panel size and those that did not. Even if self-reported panel size data may lack precision, the strong association with many predictors suggests that we are detecting a meaningful signal and not simply random error in panel size estimates. We cannot reject the possibility that a bias toward estimating inaccurately high or low panel sizes is systematically associated with some of the predictors in our study. As for all cross-sectional studies, causal inferences should be made with caution.

In conclusion, our findings highlight the multifaceted influences that shape family physician panel sizes, revealing important variations based on practice type, team composition, and scope of practice as well as a decrease in average panel sizes over time independent of shifts in physician and practice characteristics. Our results suggest the need to support independent practices, understand how panel sizes many need to be smaller in practices serving socially complex and high-need patients, promote team-based and collaborative care models, and ensure adequate support for family physicians providing obstetric and inpatient services. The findings underscore the importance of tailoring panel size considerations to the specific contexts and capacities of individual practices and clinicians, and the need for ongoing monitoring of trends in panel sizes to inform workforce planning and practice expectations.

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