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Geographic variations in gender differences in cataract surgery volume among a national cohort of ophthalmologists

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Purpose: To assess factors associated with gender disparities in cataract surgery volume and evaluate how these differences have changed over time.

Setting: Cataract surgeons in the 2012 to 2018 Medicare database.

Design: Retrospective study.

Methods: The association of provider gender with the number of cataract surgeries per office visit billed was assessed with negative binomial regression models, controlling for calendar year, years in practice, hospital affiliation, geographic region, rurality, density of ophthalmologists, and the national percentile of Area Deprivation Index (ADI) score for the practice location.

Results: There were 8480 cataract surgeons, most of whom were male (78%). Male surgeons worked in more deprived areas with a higher ADI (median: 40 vs 33, *P* < .001). Female surgeons performed fewer cataracts per year (140 [95% CI, 126-154] vs 276 [95% CI, 263-288], *P* < .001) and billed fewer office visits (1038 [95% CI, 1008-1068] vs 1505 [95% CI, 1484-1526], *P* < .001). In multivariate analysis, the number of cataract surgeries per office visit was greater for males compared with females in all years in the South (average incidence rate ratio 1.80), Midwest (1.50), and West (1.53), but not in the Northeast (1.16). The relative rate of cataract surgeries between male and female surgeons in each region did not change significantly over time from 2012 to 2018 (*P* > .05 in each region).

Conclusions: Gender disparities in cataract volume among male and female surgeons have remained unchanged over time from 2012 to 2018. The higher cataract volume among male surgeons may be explained in part by provider practice location. Further studies are needed to better understand and address gender disparities.

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Gender equity is an increasingly important issue in the field of medicine as more women are entering the field. The number of women matriculated in U.S. medical schools has exceeded the number of men since 2017 to 2018 and is up to 53.6% in 2020 to 2021.[1,2] Similarly, the proportion of active ophthalmologists in the United States who are female has been increasing since 2004 from 17.3% up to 26.7% in 2019.[3,4] Even more, 41.2% of current ophthalmology residents who are soon to join the workforce are female.[5] Despite increasing representation, significant differences in clinical volume and compensation have been noted between male and female physicians in multiple medical fields including ophthalmology.[6–12] These differences also persist for cataract surgery, the most commonly performed surgical procedure in the United States.[6–8,13,14] Female surgeons perform fewer cataract surgeries compared with male surgeons starting as early as residency training, not only in the United States but also abroad.[15–17] Even after graduation from residency training, women on average continue to perform fewer cataract surgeries compared with their male counterparts both on the local and national levels.[6–8] Furthermore, it is well established that the rate of cataract surgery is not uniform across the United States and that there are significant geographic variations by community.[18–20] Thus, we hypothesized that some of these gender differences may be accounted for by local geographic characteristics and practice patterns. Previous studies of gender disparities in cataract volume have not taken into

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account the local geographic differences that could explain some of the surgeon gender differences. In addition, it remains unknown how these gender disparities have changed over time on the national level.

The purpose of this study was to evaluate differences in cataract volume among male and female surgeons in the Medicare database from 2012 to 2018. We sought to determine whether gender disparities changed over time and whether there were geographic characteristics that might explain these gender differences.

METHODS

This study was approved by the institutional review board at the Johns Hopkins University School of Medicine and adhered to the tenets of the Declaration of Helsinki.

Data Source

The primary data source was the 2012 to 2018 Medicare Provider Utilization and Payment Data, Physician and Other Supplier Public Use Files (PUF).[21] This database contains Medicare claims submitted under the Medicare fee-for-service program by U.S. physicians in the 50 states, District of Columbia, and U.S. territories for each year. The number of services billed by each physician, identified by the National Provider Identifier, is reported for each distinct Healthcare Common Procedure Coding System service code. Only Healthcare Common Procedure Coding System codes billed to at least 10 distinct patients are reported in the database. We linked this main data source to several other datasets as previously described.[12] We obtained demographic information including year of graduation from medical schools and hospital affiliation for Medicare physicians from the Physician Compare National Downloadable File.[22] We mapped the ZIP code of the provider's practice to the Federal Information Processing Standards Publication county codes using the U.S. Department of Housing and Urban Development mapping file.[23,24] The first matched county from the mapping file for each ZIP code was used for analyses. County codes were then classified by rurality as metropolitan or nonmetropolitan using the U.S. Department of Agriculture county classification system and assigned a geographic region using the U.S. Census Bureau classification system.[25,26]

In each county, the density of ophthalmology was calculated using the U.S. Department of Health and Human Services' Area Health Resources Files as the number of ophthalmologists per 100 000 residents. The Area Health Resources Files contain information on the number of ophthalmologists in years 2010, 2015, and 2018 and the population averages from the U.S. Census Bureau for each year from 2012 to 2018.[27,28] The density of ophthalmologists per county residents was calculated using data from the year closest to the PUF (eg, for the 2016 to 2017 PUF, the number of ophthalmologists from 2015 was divided by the population estimates for 2017).

Provider addresses were geocoded using SAS PROC GEOCODE (SAS/STAT software, v. 9.4 of the SAS System for Windows, SAS Institute, Inc.) to a 12-digit Federal Information Processing Standards Publication block group code based on the 2018 U.S. Census Bureau TIGER/Line Shapefiles.[29] An additional round of geocoding was then performed using the Federal Communications Commission geocoder and the 2010 U.S. Census Bureau TIGER/Line Shapefiles.[30] Only addresses matched on street, address, or venue levels were included for analyses. The geographic boundaries that define block groups are updated once a decade; thus, geocoding from the 2010 and 2018 TIGER/Line Shapefiles should yield the same results.[31,32] U.S. census block groups contain between 600 and 3000 people and are the smallest geographic area for which U.S. census data are reported.[33] The block group was then matched to the 2018 Area Deprivation Index (ADI). The ADI is a factor-based composite measure of neighborhood socioeconomic disadvantage in the United States based on 17 U.S. census poverty, education, housing, and employment indicators.[31,34] Each U.S. census block group is associated with an ADI score that is sorted into percentiles of increasing ADI and reported as a national percentile rank of that score.[31] Lower percentile ranking indicates less social disadvantage.

Inclusion and Exclusion Criteria

Ophthalmologists with MD or DO credentials more than 4 years from medical school graduation at the time of the PUF who performed cataract surgery and billed for office encounters in the 50 states and the District of Columbia were included in the analysis. We reasoned that most physicians have finished residency training 4 years after medical school graduation. Cataract surgeries and office encounters were defined based on *Current Procedural Terminology* codes (Supplemental Table 1, http://links.lww.com/JRS/A552).[6] The total number of office encounters billed was used as a proxy for general clinical volume. Providers who performed predominantly subspecialty surgeries in the cornea, glaucoma, oculoplastics, retina, and neuro-ophthalmology/pediatrics in any year were excluded.[35] This decision was made because of the small numbers of providers in some of the subspecialties (eg, neuro-ophthalmology) and the inherent gender disparities within other subspecialties (eg, vitreoretinal surgery).[36] Excluding subspecialists would allow us to evaluate the gender effect among a more homogenous group of ophthalmologists.

Statistical Analysis

Negative binomial regression models using generalized estimating equations with robust variance were used to take into account repeated observations of unique physicians over the 7 years of longitudinal Medicare data. The generalized estimating equations account for the correlation among repeated measures of the same provider across distinct calendar years. The outcome was the number of cataract surgeries performed by each provider with an offset using the total number of office visits billed during the same time period. The main exposure variable of interest was the gender of the provider. Models were constructed controlling for year of Medicare data (2012 to 2018), years since graduation from medical school that was used a surrogate to estimate years in practice (grouped into categories of 10 years), hospital affiliation of the provider (binary variable), geographic region (Northeast, South, Midwest, and West), rurality (metropolitan and nonmetropolitan), density of ophthalmologists (per 100 000 county residents), and the national percentile of block group ADI score. The model was also constructed using a quadratic term for the calendar year of Medicare data to allow for nonlinear increases in the number of cataract surgeries performed over time in each geographic region, interactions of the gender effect in each region over time, and interactions of the other explanatory variables with region.

The *t* test was used to test differences between continuous variables; the Wilcoxon rank-sum test was used to test differences in ordinal variables and the Pearson chi-squared test for categorical variables. The Wald test was used to test the significance of the change in the gender effect in each region over time in the multivariate model. Statistical significance was set at $P < .05$. All analyses were performed using Python (Python Software Foundation. Python Language Reference, v. 3.8.9) and Stata (Statacorp. 2019. Stata Statistical Software: Release 16, Statacorp LLC).

RESULTS

A total of 8480 unique cataract surgeons were included in the study. Most surgeons were male (78%, n = 6629) (Table 1). Male surgeons appeared in the database for more

Table 1. Demographic characteristics of catarafct surgeons in the 2012 to 2018 Medicare provider utilization and payment data, physician and other supplier public use files

Parameter	F (n = 1851)	M (n = 6629)	*P* value
No. of years[a] (95% CI)	5.4 (5.3, 5.5)	6.2 (6.1, 6.2)	<.001
Years in practice, n (%)			
≤10 y	966 (52.2)	1943 (29.3)	<.001
>10 and ≤20 y	537 (29.0)	1865 (28.1)	
>20 and ≤30 y	289 (15.6)	1868 (28.2)	
>30 y	59 (3.2)	953 (14.4)	
Region, n (%)			
Northeast	494 (26.7)	1441 (21.7)	<.001
South	434 (23.4)	1449 (21.9)	
Midwest	552 (29.8)	2319 (35.0)	
West	371 (20.0)	1420 (21.4)	
Rurality, n (%)			
Metropolitan	1717 (92.8)	5989 (90.3)	<.01
Nonmetropolitan	134 (7.2)	640 (9.7)	
Hospital affiliation, n (%)			
False	861 (46.5)	3309 (49.9)	<.05
True	990 (53.5)	3320 (50.1)	
Density of ophthalmologists,[b] median (IQR)	6.99 (4.85, 9.96)	6.36 (4.34, 8.92)	<.001
ADI national percentile,[c] median (IQR)	33 (15, 58)	40 (20, 63)	<.001
Total no. of cataract surgeries, mean (95% CI)	829 (758, 920)	1823 (1735, 1910)	<.001
No. of cataract surgeries per year, mean (95% CI)	140 (126, 154)	276 (263, 288)	<.001
Total no. of office visits, mean (95% CI)	3151 (5921, 6382)	9763 (9607, 9919)	<.001
No. of office visits per year, mean (95% CI)	1038 (1008, 1068)	1505 (1484, 1526)	<.001
Ratio of cataract surgeries to office visits per year, mean (95% CI)	0.15 (0.13, 0.17)	0.25 (0.22, 0.28)	.001

ADI = Area Deprivation Index; IQR = interquartile range
[a]Average number of years a provider appears in the 7-year dataset
[b]Number of ophthalmologists per 100 000 residents in the county
[c]National percentile of block group ADI score, lower percentile indicates less disadvantage

years than females (on average 6.2 and 5.4 years of the 7-year analysis period, respectively, $P < .001$). Male surgeons were also in practice longer than female surgeons, with 42.6% of males vs 18.8% of females in practice for more than 20 years ($P < .001$). A greater proportion of males (56.4% vs 49.8%) worked in the Midwest and West, whereas a greater proportion of females (50.1% vs 43.6%) worked in the Northeast and South ($P < .001$). More female surgeons compared with males worked in metropolitan locations (92.8% vs 90.3%) and at practices affiliated with hospitals (53.5% vs 50.1%) ($P < .001$). On average, female surgeons worked in counties where there was a greater density of ophthalmologists per 100 000 residents (median: 6.99 compared with 6.36, $P < .001$). Male surgeons worked in more deprived areas associated with a higher national ADI percentile (median: 40 compared with 33, $P < .001$).

Each unique male surgeon performed an average of 276 (95% CI, 263-288) cataracts per year and 1505 (95% CI, 1484-1526) office visits per year, whereas female surgeons performed 140 (95% CI, 126-154) cataracts and 1038 (95% CI, 1008-1068) office visits ($P < .001$) on Medicare patients (Table 1). Males performed 0.25 (95% CI, 0.22-0.28) cataracts per office visit per year, whereas women performed 0.15 (0.13-0.17) ($P < .001$) (Table 1). The predicted numbers of cataract surgeries among male and female providers in each region by year adjusted for the mean values of the other covariates using the model are shown in Figure 1.

In multivariate analysis controlling for years in practice, hospital affiliation, rurality, the number of available ophthalmologists, and the national percentile of ADI score, males performed statistically significantly more cataract surgeries per office visit compared with females in all Medicare years (2012 to 2018) in the South, Midwest, and West, but not in the Northeast (Table 2). The rate of cataract surgeries comparing male and female surgeons did not change significantly over time from 2012 to 2018 in any of the regions ($P > .05$ in each region) (Table 2). Sensitivity analysis restricted to cataract surgeons in the first 10 years of practice demonstrated overall similar findings. The other covariates in the model are also associated with relative rates of cataract surgeries. Providers 10 to 20 years in practice performed a higher rate of cataract surgeries compared with providers less than 10 years in practice in the South and West (Table 2). Providers in the Northeast and South in practices affiliated with hospitals performed lower rates of cataract surgeries than those who were not affiliated with hospitals. Providers in nonmetropolitan counties in the South, Midwest, and West performed higher rates of cataract surgeries than those in metropolitan settings. The density of ophthalmologists did not affect the relative rate of cataract surgeries in any region. Providers practicing in more deprived areas with a higher percentile

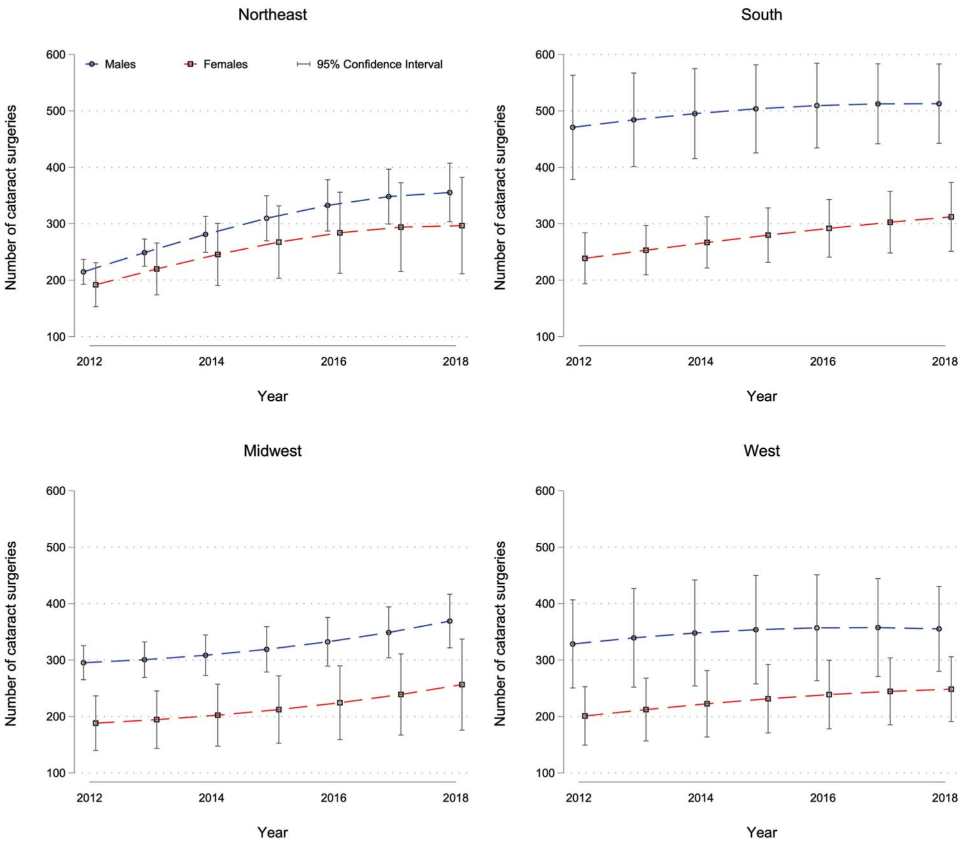

Figure 1. Adjusted¥ predicted number of cataract surgeries performed by male and female ophthalmologists by year in each region. ¥Adjusted for the mean values of years in practice, hospital affiliation, rurality of the practice location, practice category, density of ophthalmologists in the county, and the national percentile of block group Area Deprivation Index score.

of ADI score in the Northeast, Midwest, and West performed higher rates of cataract surgeries (Table 2).

DISCUSSION

Between 2012 and 2018, the average male ophthalmologist performed about 1.80 times as many cataract surgeries as females in the South, 1.53 in the West, 1.50 in the Midwest, and 1.16 in the Northeast, after accounting for general clinical productivity (ie, number of office visits) and demographic and geographic factors. These differences in gender disparities did not significantly change from 2012 through 2018. More male surgeons practiced in nonmetropolitan areas and more deprived areas compared with females. After controlling for local characteristics including rurality and the national percentile of ADI score, the differences in cataract volume between males and females in the Northeast were no longer significant but persisted in the other regions. These findings suggest that perhaps differences in the types of practice that men and women join and different regional referral patterns may be contributing to gender disparities in cataract surgery volume.

This study adds to the growing literature documenting gender disparities in cataract volume among male and female surgeons. On the local level, women ophthalmologists in Florida performed about half the annual rate of cataract surgery as their male counterparts from 2005 through 2012.[7] On the national level, Feng et al. used the 2017 Medicare Provider Utilization and Payment Data to show that gender differences persisted after controlling for clinical productivity and number of years in practice and were ubiquitous across all geographic regions.[6] Differences in conclusions regarding the role of geography and its effect on gender disparities are likely due to the inclusion of smaller geographic units in our study, the census block group level, as compared to the larger U.S. Census Regions in the Feng study. Our study used data from the Medicare Provider Utilization and Payment Data years 2012 to 2018, whereas the Feng study used 2017. Fluctuations of the data over time could also drive differences in conclusions.[15] Gender disparities in cataract surgery volume have been demonstrated in other countries as well. Micieli et al. found that male surgeons in Ontario, Canada, performed more surgeries per person than their female counterparts, and this gap grew from 1.4 times to 1.7 times from 2000 to 2013.[8] In this study, the relative rate of cataract surgery between male and female surgeons increased from 1.11 to 1.19 in the Northeast, declined from 1.97 to 1.64 in the South, declined from 1.58 to 1.45 in the Midwest, and declined from 1.64 to 1.43 in the West. However, none of these apparent trends reached statistical significance. It could be because we only analyzed 7 years of data, which include all publicly available data from Centers for Medicare and Medicaid Services at the time of the analysis, and we might have found a statistical significance if more longitudinal data were used.

Our geographic analysis showed that men and women work in different areas of the country. More women work in metropolitan areas and in counties with a higher density of ophthalmologists and less deprived areas with a lower ADI percentile. This finding is not surprising. Labor economists have found that there is a trend of educated women being overrepresented in larger metropolitan areas, particularly if their spouse also has a college degree.[37] The geographic location of the practice, whether in a nonmetropolitan setting or in a deprived area, independently affects the volume of cataract surgeries. In this study, in general, practices in rural settings have higher relative rates of cataract surgery compared with metropolitan settings. More deprived areas with a higher ADI percentile also have higher rates of cataract surgeries compared with less deprived areas. Studies in England show similar findings in which the rate of cataract surgery is positively correlated with the index of deprivation—the greater the deprivation in an area, the higher the rate of cataract surgery.[38] The authors suggest that such differences in the rate of cataract surgery by social deprivation could be driven by a higher prevalence of cataracts in the more deprived areas or differences in local referral patterns. The geographic location of the practice clearly affects cataract volume independent of the provider gender. Indeed, after taking into account these local geographic characteristics including rurality and social deprivation, there was no longer a statistically significant difference in cataract volume between male and female surgeons in the Northeast.

However, accounting for local geographic differences did not eliminate the gender disparities in cataract volume in the other regions—the South, West, and Midwest. It could be that there are additional geographic differences not accounted for in the variables that were chosen for this study. The 2012 to 2018 Medicare Provider Utilization and Payment Data PUF used for the current analysis only includes charges from the Medicare fee-for-service program and does not include data from Medicare Advantage plans. In regions with higher enrollment in the Advantage plans as compared to the traditional fee-for-service program, the PUF will underrepresent the number of cataracts performed by providers.[39] Of interest, the density of ophthalmologists per county resident was not associated with cataract surgery volume. It is well established that eyecare availability is unevenly distributed across the country, and that certain regions of the country, particularly rural areas, have lower concentrations of cataract surgeons.[18,20] Although we hypothesized that physicians practicing in areas with lower density of ophthalmologists, and theoretically cataract surgeons, would in turn have a higher volume of cataract surgeries, this was not the case. It could be that the number of available ophthalmologists from the AHRP data does not reflect the number of available cataract surgeons, which would be more relevant for this analysis.

In addition to geographic differences on the county level, male and female surgeons work in different types of practices. More female surgeons belonged to practices affiliated with hospitals. In the Physician Compare file, hospital affiliation is determined through self-report, inpatient hospital, outpatient hospital, and physician and ancillary service claims. The healthcare professional must provide services to at least 3 patients on 3 different dates in the past 12 months.[40] The hospital affiliation and setting in which cataract surgeries are performed can affect surgical volume. Cataract surgeries performed in hospital outpatient departments (HOPDs) are less efficient than those performed in ambulatory surgery centers (ASCs).[41,42] ASCs have greater surgical efficiency and lower turnover times and subsequently increased surgical volume.[43,44] Across all types of surgeries, the average surgical experience is reduced by at least 30 minutes when performed in an ASC compared with an HOPD.[44] Differential access to ASCs by male and female surgeons could underlie some of the differences in cataract volume. We were unable to evaluate the proportion of cataract surgeries performed in HOPDs compared with ASCs by providers using this dataset. Future studies can more directly assess whether the proportion of cataracts performed in HOPDs and ASCs is different for male and female surgeons.

Finally, there are nongeographic and practice setting differences that also drive differences in gender disparities in cataract volume. In this study, women billed fewer office visits—a proxy for the number of patients evaluated—compared with men. This is consistent with previous studies showing that women see fewer patients compared with men.[12] The reasons why women see fewer patients are unknown. It could be that they spend more time with patients, have more administrative or teaching responsibilities, or elect to have a schedule more compatible for work-life integration.[10,45,46] It is also possible that there are structural inequities in the workplace that limit referrals and access to patients.[12,47] For surgical procedures, the number of patients evaluated directly affects the number of potential surgeries. However, even taking into account the number of office visits, women have a lower ratio of cataract surgeries per office visit compared with men. There could be behavioral factors such as not recommending cataract surgeries or differences in the types of patients evaluated that explain this finding. For example, surveys suggest that female primary care and general internal medicine physicians, when compared with their male counterparts, care for more psychosocially complex patients.[48] Differences in the proportion of patients seeking cataract evaluations compared with routine ophthalmic care in a provider's practice will affect the rate of conversion to surgery. It could be that patients are self-selecting who they choose as providers, but other factors including referrals might play a role as well. Further work is needed to explore the potential nongeographic reasons accounting for gender disparities in cataract surgery. What is encouraging from our study is that at least some of the disparities between women and men cataract volume are a result of where surgeons practice and local referral patterns that are irrespective of the provider's gender. As the need for cataract surgeries increases with the aging population and more women enter ophthalmology, careful consideration should be given to eliminate any

Table 2. Adjusted[a] relative rate of cataract surgery per year accounting for the number of office visits

	Northeast (n = 11 416)				South (n = 11 351)			
Parameter	**N**	**IRR**	**CI**	***P* value**	**N**	**IRR**	**CI**	***P* value**
Gender: M vs F[b]								
Year 2012	1591	1.12	0.90, 1.39	.305	1549	1.97	1.57, 2.47	<.001
Year 2013	1605	1.13	0.91, 1.41	.263	1582	1.91	1.56, 2.6	<.001
Year 2014	1622	1.14	0.91, 1.47	.241	1596	1.86	1.52, 2.26	<.001
Year 2015	1636	1.16	0.91, 1.47	.235	1623	1.80	1.49, 2.18	<.001
Year 2016	1646	1.17	0.90, 1.52	.239	1642	1.75	1.44, 2.11	<.001
Year 2017	1664	1.18	0.89, 1.58	.249	1671	1.69	1.39, 2.06	<.001
Year 2018	1652	1.20	0.87, 1.64	.263	1688	1.64	1.33, 2.03	<.001
Overall *P* value[c]				.579				.211
Years in practice								
≤10 y	2153	Reference			2691	Reference		
10-20 y	3118	0.87	0.75, 1.02	.084	3334	1.14	1.01, 1.28	<.05
20-30 y	3585	0.99	0.74, 1.32	.951	3629	1.11	0.87, 1.41	.414
>30 y	2560	1.00	0.76, 1.31	.960	1697	1.06	0.80, 1.41	.689
Hospital affiliation								
False	5113	Reference			3579	Reference		
True	6303	0.78	0.61, 0.99	<.05	7772	0.68	0.55, 0.85	.001
Rurality								
Metropolitan	10 646	Reference			9793	Reference		
Nonmetropolitan	770	1.03	0.71, 1.50	.859	1558	1.28	1.01, 1.62	<.05
Density of ophthalmologists[d]		0.99	0.98, 1.00	.089		0.98	0.96, 1.01	.188
ADI national rank[e]		1.06	1.03, 1.10	<.001		1.03	0.99, 1.07	.188

ADI = Area Deprivation Index; IRR = incidence rate ratio
[a]Adjusted for Medicare calendar year, provider gender, years in practice, hospital affiliation, rurality of the practice location, practice category, density of ophthalmologists in the county, and national percentile of block group ADI score
[b]The relative rate of cataract surgery comparing males with females in each year by region
[c]The statistical significance of change in the relative rate of cataract surgery by gender in each year compared with baseline year
[d]Number of ophthalmologists per 100 000 residents in the county
[e]For every 10 unit increase in the national percentile of block group ADI score

potential gender disparities among cataract surgeons to ensure that the ophthalmic workforce is able to meet the increasing demands for cataract surgeries.

There are several limitations to our study. The database excludes codes submitted for fewer than 10 distinct patients for each provider; thus, we could be missing gender differences among the low-volume cataract surgeons. We also excluded providers who performed surgery but did not bill for office visits and thus may be ignoring gender differences among particularly high-volume cataract surgeons. We excluded providers who performed subspecialty surgery and cataract surgery, which could represent younger surgeons. However, the average number of years in practice in the excluded group, representing 222 unique providers, was similar to the included cohort (data not shown). We are using the Medicare fee-for-service database, and the results of the study might not be generalizable to non-Medicare billing providers. We could be underestimating surgical volume for providers whose practices predominantly bill non-Medicare insurances, although estimates indicate that at least 80% of cataract surgeries in the United States are performed on Medicare beneficiaries.[14,49] It is also possible that there are gender differences in who may be more likely to be non-Medicare billing providers; if female surgeons are more likely to be non-Medicare providers because they work in metropolitan areas, this could lead to underrepresentation of their cases in this analysis. However, using the number of office visits in the denominator as the offset for the outcome should be partially control for the proportion of Medicare beneficiaries seen in a provider's practice. Finally, because we are using the Medicare PUF that does not include individual patient data, we are unable to evaluate any clinical implications of provider gender differences, for example, in rates of cataract surgery complications or visual acuity outcomes.

In summary, our findings demonstrate that gender disparities in cataract surgery volume among practicing ophthalmologists across the United States have remained unchanged over time from 2012 to 2018. The higher cataract volume among male surgeons is partially explained by different local geographic characteristics of where providers choose to practice; specifically, more men practice in rural locations and areas with higher social deprivation where there are higher rates of cataract surgeries. Accounting for these local geographic characteristics eliminated the difference in cataract volume among men and women in the Northeast, but not other regions of the country. Additional research is required to determine whether the differences in practice location characteristics between male and female ophthalmologists are due to choice or structural inequities in opportunities available to men and women.

Table 2. Continued

Midwest (n = 17 479)				West (n = 10 765)			
N	IRR	CI	*P* value	N	IRR	CI	*P* value
2367	1.57	1.19, 2.06	<.01	1437	1.63	1.22, 2.20	<.01
2401	1.55	1.17, 2.05	<.01	1476	1.60	1.20, 2.13	<.01
2454	1.52	1.14, 2.04	<.01	1501	1.56	1.18, 2.08	<.01
2503	1.50	1.11, 2.03	<.01	1523	1.53	1.16, 2.02	<.01
2555	1.48	1.08, 2.03	<.05	1571	1.50	1.13, 1.97	<.01
2599	1.43	1.05, 2.03	<.05	1609	1.46	1.11, 1.93	<.01
2600	1.44	1.01, 2.04	<.05	1648	1.43	1.08, 1.89	<.05
			.557				.105
3999	Reference			2475	Reference		
5048	1.05	0.92, 1.20	.461	3417	1.12	1.02, 1.22	<.05
5120	1.02	0.89, 1.17	.752	2956	1.22	0.98, 1.52	.076
3312	0.97	0.81, 1.16	.742	1917	1.07	0.86, 1.33	.570
9704	Reference			6323	Reference		
7775	1.02	0.84, 1.25	.819	4442	0.73	0.52, 1.01	.060
15 719	Reference			9970	Reference		
1760	1.60	1.19, 2.14	<.01	795	3.31	1.08, 10.11	<.05
	1.01	0.99, 1.02	.411		0.99	0.95, 1.03	.498
	1.05	1.02, 1.09	<.01		1.14	1.09, 1.19	<.001

WHAT WAS KNOWN

- Gender disparities exist in ophthalmology whereby female cataract surgeons perform fewer cataract surgeries compared with their male counterparts.

WHAT THIS PAPER ADDS

- Gender disparities in cataract volume among male and female surgeons have remained unchanged over time from 2012 to 2018.
- The higher cataract volume among male surgeons may be explained in part by provider practice location—practicing in more nonmetropolitan areas and areas with higher social deprivation.

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36. References 36–49 are listed in Supplemental Data File (http://links.lww.com/JRS/A553)

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