Gender Differences in Ophthalmologists' Annual Incomes

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Objective: To understand the association between provider gender and ophthalmologists' annual incomes.

Design: Retrospective analysis of survey data collected from ophthalmologists by the American Medical Association (AMA) between 1992 and 2001.

Participants: Six hundred thirty white male and 62 white female actively practicing ophthalmologists who responded to the AMA's survey of physicians between 1992 and 2001 and who worked in an office-based practice.

Methods: A linear regression model was generated to determine the association between provider gender and ophthalmologists' annual incomes after controlling for work effort, provider characteristics, and practice characteristics.

Main Outcome Measures: Annual incomes of male and female ophthalmologists in 2004 dollars after controlling for work effort, provider characteristics, and practice characteristics.

Results: White female ophthalmologists reported having 24% fewer visits and working 5% fewer annual hours than their white male counterparts. White female ophthalmologists had practiced medicine for fewer years than white males and were more likely to be employees, as opposed to having an ownership interest in the practice, but less likely to be board certified. After adjustment for work effort, provider characteristics, and practice characteristics, white females' mean annual income was $219 194, or $55 091 (20%) lower than white males' (95% confidence interval, −$93 611 to −$16 572; $P = 0.005$).

Conclusions: During the 1990s, female gender was associated with lower annual incomes among ophthalmologists. Observed differences may be attributable to factors that we were not able to measure, such as whether the clinician practice was predominantly medical or surgical. However, just as policymakers are exploring gender differences in access to and outcomes of health care, they should further explore gender-based income differences among physicians. *Ophthalmology 2007;114:1696–1701 © 2007 by the American Academy of Ophthalmology.*

Women have historically earned less than men. In the United States, however, the ratio of women's to men's median hourly wages increased from 63% in 1979 to 77% in 1999. Women's wages increased relative to men's because more women entered the work force, fewer women received minimum wages, and the real wages of men decreased.[1]

Since the late 1970s, gender has been shown to be associated with lower incomes among U.S. physicians, even after adjusting for work effort.[2] More recent studies that also adjusted for physician age and specialty[3–6] revealed similar income disparities, although one found that controlling for the combination of specialty status, personal data, and female physicians' less lucrative practice arrangements eliminated income differences among younger physicians.[7]

Because women represent an increasingly large proportion of medical students,[8] the practicing physician work force,[9,10] and the ophthalmology residency workforce,[11] we were interested in determining whether income disparities attributable to gender existed among a highly specialized and select group of physicians: ophthalmologists. To date, no studies have compared incomes of male and female

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ophthalmologists. Therefore, we used survey data from the 1990s to explore the influence of gender on the incomes of white ophthalmologists, after adjusting for work effort, practice characteristics, and provider characteristics that are likely to influence physician incomes.

Materials and Methods

Data Source

Between 1992 and 2001, the American Medical Association (AMA) conducted regular telephone surveys of physicians through its socioeconomic monitoring survey. That survey collected a broad variety of individual physician–level data, including weeks and hours of practice, number of patient visits seen, provider characteristics, practice characteristics, and physician incomes.[12] The survey was designed to provide representative information on the population of all actively practicing nonfederal physicians who spend the greatest proportion of their time in patient care activities; weights for each respondent were calculated to correct for potential bias created by unit nonresponse and survey eligibility and to ensure that physician responders reflected the national distribution of physicians.[12]

Survey Methods

Each year, the telephone-administered survey was conducted on a random sample of the AMA Masterfile that is eligible for the survey. The following physicians were excluded: doctors of osteopathy, foreign medical graduates with temporary licensure, inactive physicians, physicians who were sampled during the last 5 years, physicians on the "do not contact" list, physicians not practicing in the U.S., and physicians with no license. In addition, after initial screening, federally employed physicians and physicians who spent <20 hours each week in patient care activities were excluded.

The following field procedures were developed to minimize nonresponse bias: 2 weeks before data collection, advance letters were sent describing the process and survey; many specialty organizations provided endorsement letters; and summaries of the type of expense questions to be asked were provide in advance of the survey. In addition, a minimum of 4 callbacks to respondents were made before abandoning interview efforts, letters encouraging participation were sent to physicians who initially refused participation, and refusal conversion attempts were made by select interviewers.[12]

Survey Weights

Survey weights were derived by first dividing the AMA Physician Masterfile population and survey respondents into 200 cells defined by specialty, years since the respondent received an MD degree, AMA membership status, and board certification status. Unit response rates were constructed as the ratio of the number of physicians in the population to the number of respondents in each cell. Second, an eligibility correction was employed, as only nonfederal patient care physicians—excluding residents—were eligible. The eligibility correction divided the subset of the population for which eligibility was known into 40 cells (according to years in practice, AMA membership status, gender, and board certification) and calculated the proportion of physicians in each cell who were eligible. This defined the eligibility weight. The overall weight applied for a given respondent was the product of the unit response weight and the eligibility weight.[12]

Sample

Although the survey had been conducted for much longer, we limited our analysis to data collected between 1992 and 2001 for 2 reasons. First, during the study period, physicians were categorized into different specialty groups in a way that allowed for the disaggregation of responses from ophthalmologists and other specialists. Second, these were the most recent data available for analysis and, therefore, likely to be the most relevant to the currently practicing physician workforce.

A sequential process of eliminating survey respondents was used to ensure that the physicians included in the analyses were comparable (Fig 1). Although we could have used other methods

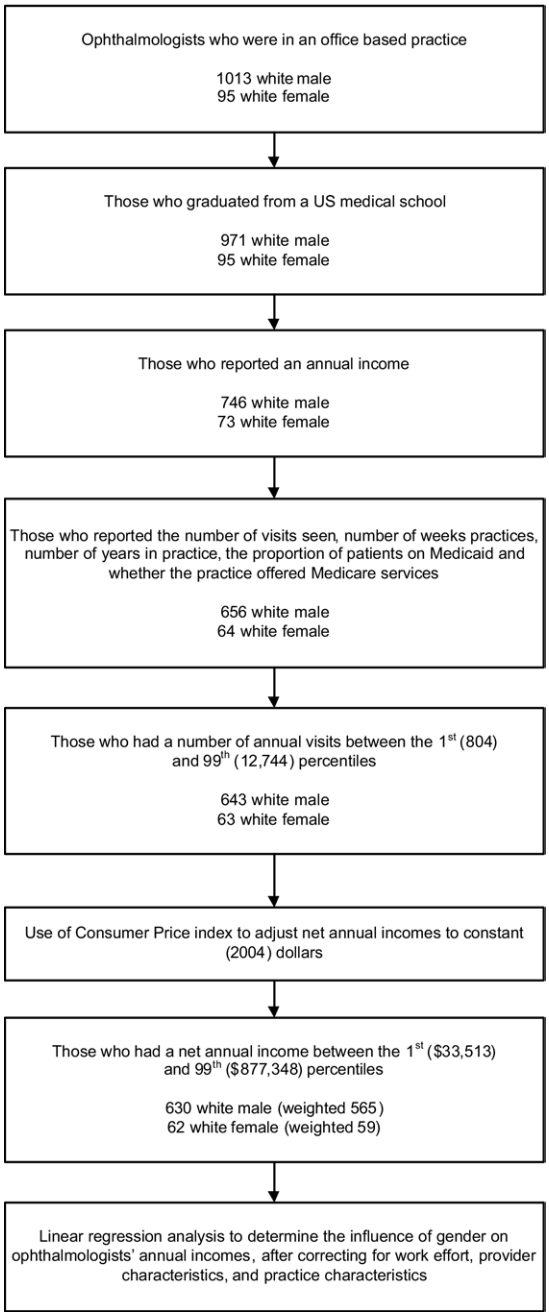

Figure 1. Sample and methods used.

to generate a fair comparison group, this process of selection allowed us to analyze ophthalmologists with relatively similar provider and practice characteristics. Because we were interested in examining ophthalmologists with a common practice setup, we included only physicians who worked in an office-based practice, thereby eliminating a minority of ophthalmologists who worked primarily in research or administration or who were employed by hospitals. Because of a concern that race might influence results and because there were so few black respondents to the survey who were ophthalmologists, we included only self-identified white physicians in the study, and we further limited our analysis to those who graduated from a U.S. medical school, leaving 971 white male and 95 white female ophthalmologists. In addition, we included only respondents who provided information on key variables, and we excluded extreme outliers in annual patient visits and net incomes. This process left 630 white male and 62 white female ophthalmologists available for analysis. Using survey weights, these respondents represented 565 white male and 59 white female ophthalmologists.

Variables Proposed to Influence Physicians' Incomes

From the AMA data set, we extracted 3 types of independent variables that were likely to influence the dependent variable—net annual income:

1. *Physician work effort.* Although it has been demonstrated that hours worked is an important variable in analysis of physician incomes,[3–6,13] the number of visits a physician sees each year may influence annual incomes. Although private practice physicians typically bill based on patient visits, employed physicians are likely to have either quotas or incentive-based production bonuses associated with patient visit volumes such that compensation methods are unlikely to be related to use of health services per person.[14] Indeed, among the study sample, there were modest linear relationships between inflation-adjusted annual physician incomes and both annual hours worked (r = 0.10, P = 0.017) and annual patient visits seen (r = 0.40, $P<0.001$).
2. *Provider characteristics.* When making gender comparisons of physician incomes, age has commonly been used as an adjustment factor.[3–6] Over the working lifetime, incomes demonstrate an inverted-U pattern[15] that typically peaks near age 55 for physicians,[16,17] or after 20 to 25 years of practicing medicine. To dispel a concern that gender might influence the age at which a physician entered medical school and therefore bias results, we incorporated the number of years that respondents had been practicing medicine into the analysis instead of physician age. Among the study sample, number of years practicing medicine was highly correlated with age (r = 0.88, $P<0.001$). In addition, because practice arrangements, such as having an ownership interest in the practice, have been associated with differences in annual income among physicians,[7] we included whether the physician was an employee, as opposed to a full or partial owner of the practice, in the analysis. Finally, because board certification has been associated with higher incomes,[18] we included board certification status as an independent variable in the analysis.
3. *Practice characteristics.* Physicians' annual incomes vary modestly according to the U.S. Census region in which they practice[12]; therefore, we collected information on the U.S. census region in which the practice was located. In addition, because physicians who live in sparsely populated settings have been shown to have both lower[19] and higher[20] incomes, we categorized responding physicians' county codes into 3 categories of metropolitan settings (<50 000, between 50 000 and 500 000, >500 000). Finally, because disproportionate service of the medically indigent and those with relatively poor insurance has been hypothesized to decrease physicians' incomes,[21] we incorporated variables likely to reflect those factors into the analysis: whether the practice provides Medicare services and the reported proportion of patients in the practice who are on Medicaid.

Calculated and Dummy Variables

We used the overall consumer price index[22] to adjust reported net annual income to constant 2004 dollars. We multiplied the reported number of weeks worked in the last year by the total number of hours worked in the last week and total number of visits seen in the last week to calculate the annual number of hours worked and annual number of visits seen, respectively. Because of the inverted-U relationship between number of years practicing medicine and annual incomes, we constructed dummy variables that reflected the categorization of years practicing medicine into 5-year increments, from 0 to 5 years practicing through 40+ years practicing. Although we used these dummy variables in the regression analysis, we aggregated years practicing medicine into 10-year increments through 30+ years practicing for the purposes of demographic comparisons.

Analysis

When comparing demographics for male and female ophthalmologists, we used the chi-square test to compare proportions and independent-samples t test to compare continuous variables. Because data on income, hours worked, and number of years in practice were nonnormally distributed, we transformed those data to achieve normalcy. Although we conducted our statistical analyses on the transformed data, we present the untransformed means to help readers interpret the findings. To determine the influence of gender on ophthalmologists' incomes, we generated a linear regression model that adjusted for practice and provider characteristics. Within the regression model, we used dummy variables for provider gender to calculate regression coefficients and 95% confidence intervals (CIs) in a model that used the independent variables detailed above and consumer price index–adjusted annual income as the dependent variable. Because some variables—such as income and hours worked—were not normally distributed, we repeated our analyses using log-transformed data and found the same results. We used SPSS (version 12.0, SPSS Inc., Chicago, IL) and survey weights for all analyses. This study was approved by Dartmouth Medical School's Committee for the Protection of Human Subjects.

Results

After adjusting only for inflation, white male ophthalmologists had a mean net annual income of $274 285 (Table 1). Relative to white males, white females had mean annual inflation-adjusted incomes that were $87 321 (32%) lower. White female ophthalmologists reported seeing 24% fewer visits and working 5% fewer annual hours than their white male counterparts.

White female ophthalmologists had practiced medicine for fewer years than white males: very few white females who responded to the survey had practiced more than 20 years, and none had practiced more than 30 years. Females were more likely to

Table 1. Comparison of Inflation-Adjusted Income, Work Effort, and Provider and Practice Characteristics of White Ophthalmologists, by Gender

	White Ophthalmologists		
	Male (Weighted N = 565)	*Female (Weighted N = 59)*	***P* Value**
Inflation-adjusted annual income (2004 dollars)	274 285	186 964	<0.001
Physician work effort			
Total annual visits	5703	4358	<0.001
Total annual hours worked	2438	2314	0.16
Provider characteristics			
Years in medical practice (mean)	17.7	11.0	<0.001
<10	25.7%	58.6%	<0.001
10–19	37.8%	32.2%	0.4
20–29	25.7%	8.5%	0.003
≥30	11.0%	0.0%	0.007
Ownership interest and board certification			
Physician is an employee	17.9%	35.6%	0.001
Physician is board certified	90.8%	69.5%	<0.001
Practice characteristics			
Census region of practice			
Northeast	17.5%	32.2%	0.006
North central	26.6%	15.3%	0.057
Southern	32.2%	34.5%	0.7
Western	23.7%	18.6%	0.4
Practice setting			
<50 000 population	9.2%	5.1%	0.3
Population between 50 000 and 500 000	30.1%	32.2%	0.7
>500 000 population	60.7%	62.7%	0.8
Service population			
Proportion of patients on Medicaid	8.6%	9.0%	0.8
Proportion providing Medicare services	98.2%	96.6%	0.4

Percentages may not add to 100 because of rounding.

be employees, as opposed to having an ownership interest in the practice. Females were less likely than their male counterparts to be board certified. White female ophthalmologists were more likely to live in the northeastern U.S. census region and less likely to live in the north central U.S. census region. Female ophthalmologists were less likely to work in areas of low population density. A slightly greater proportion of white female ophthalmologists' patients were on Medicaid; virtually all white ophthalmologists of both genders provided Medicare services.

The regression model accounted for 21% of the variance in annual incomes (Table 2 [available at http://aaojournal.org]). Higher numbers of annual visits were associated with higher incomes; however, increased work time was associated with lower incomes, after correcting for numbers of visits seen, suggesting that productivity—visits per hour—is an important component of income generation. The coefficients for the "years practicing medicine" variables reflect the anticipated inverted-U lifetime earnings curve, although earnings peaked fairly early. Being employed, as opposed to having an ownership interest in the practice, was associated with a lower income, whereas board certification and providing Medicare services were associated with a higher income. After adjustment for these variables, white females' mean annual income was $55 091 (20%) lower than white males' (95% CI, −$93 611 to −$16 572; $P = 0.005$).

The adjustment for differences in work effort, provider characteristics, and practice characteristics partially but substantially mitigated the initial differences in inflation-adjusted annual incomes that we found between white males and females (Fig 2).

Discussion

We examined provider and practice characteristics that were likely to be associated with physicians' annual incomes, revealed differences attributable to physician gender in those characteristics, adjusted net annual incomes for observed differences, and found that gender independently contributed to lower net annual incomes among office-based ophthalmologists in the 1990s. The expected reduction in annual income for white female ophthalmologists was substantial.

Figure 2. Differences in income by gender. Gray, income difference accounted for by work effort, practice characteristics, and provider characteristics; black, income difference attributable to gender.

Our analysis uncovered a strong association between higher annual incomes and work product, as reflected by number of patient visits seen. This finding is intuitive: physician reimbursement is largely based on the volume of patients seen. In addition, we found a strong association between being an employee—as opposed to having an ownership stake in the practice—and having a lower mean annual income. This finding also has strong face validity: physicians who are employees might not be as motivated as those with an ownership interest in the practice to see additional patient visits.

The hypothesis that providing services to a large proportion of patients who are enrolled in Medicaid might adversely influence physicians' incomes[21] was only partially borne out in the regression analysis; although the regression coefficient was negative, differences attributable to a practice's Medicaid burden were not statistically significant. This may have been due to the fact that very few ophthalmologists' patients are enrolled in Medicaid.

The association between higher annual incomes and board certification is consistent with findings from the early 1980s.[18] This association might be explained in part by a propensity for provider organizations to require board certification for employment, by requirements by third-party payers that providers be board certified, or by market forces that use board certification as a marker for quality that is indirectly reimbursed. The large difference between male and female ophthalmologists' rates of board certification is surprising and difficult to explain. Female ophthalmologists may be disinclined to pursue board certification, they may be limited by the high costs of board certification, it may be too early in their practices for them to have taken board examinations successfully, or they may not do well on board certification tests.

After correcting for differences in provider and practice characteristics, our finding that white female ophthalmologists should expect annual incomes that are so heavily discounted compared with those of their white counterparts was disconcerting. Although the anticipated 20% reduction in annual incomes found for white females was somewhat greater than that found in other studies that compared work effort–adjusted female and male physicians' incomes overall,[3–6] those analyses did not take into account the variety of provider and practice variables that were examined here. Indeed, the only study that incorporated a similar, though not as extensive, complement of variables into the analysis found no difference between male and female physicians' incomes.[7]

Our analysis has several limitations. First, because the number of black respondents to the survey was small, we limited our analysis to white ophthalmologists. Our findings may not apply to ophthalmologists of other races. Second, and importantly, we were not able to determine whether respondents had a primarily medical or surgical ophthalmologic practice. This has ramifications for our primary findings in that it is possible that female ophthalmologists might pursue a lower paying medically oriented practice that might have more controllable hours, thereby allowing them to meet other commitments. Similar arguments might apply to a preference to be a salaried employee. Nevertheless, policymakers and researchers should be wary of potential circular reasoning in explaining lower incomes by choice of practice type: it may be that female ophthalmologists have fewer opportunities to pursue higher-paying surgical practices. Third, our study was limited by the methods of the socioeconomic monitoring survey, an established survey of physicians that experienced a declining survey response rate and demonstrated substantial year-to-year variation in number of respondents during the period examined. However, the ability to combine 10 years of data strengthened the study and offered a much more robust data set than would have been the case had fewer years of data been available. Third, although we adjusted incomes to constant dollars and adjusted for practice region and urbanization level, we were not able to adjust for differences in purchasing power parity across those settings—differences that were shown to mitigate constant dollar income differences among rural and urban physician practices.[20]

Finally, the study was inherently limited by the data available from the AMA survey. Although it would have been interesting to explore alternative explanations for the income disparities that we found, such as gender differences in the rate of highly reimbursed procedures, the proportion of charity care provided, respondents' educational debt burden, clinicians' levels of satisfaction with their practices, and even differences in the quality of care provided, the data that might answer these questions were not available. Indeed, our regression model accounted for only 21% of the variance in physician incomes. Clearly, additional factors that were not incorporated into the analysis are likely to influence expected physician incomes and might mitigate the differences found here.

Despite these limitations, our results suggest that female gender is independently associated with lower annual incomes among ophthalmologists. These findings should be contextualized, however. Foremost, the anticipation of financial returns typically does not drive the choice to enter the medical profession; the results presented here are therefore unlikely to dissuade females from entering ophthalmology. In addition, physicians derive many nonfinancial benefits from their roles, including prestige, the ability to serve their communities, and the opportunity to model for others of similar backgrounds the advantages of pursuing higher education—benefits that are likely to be highly motivating regardless of physician gender.

Nevertheless, the findings of this study warrant further exploration. Just as they are exploring gender differences in patient access to and outcomes from health care,[23] policy makers should explore equity among health care providers more carefully. Although salary differences between men and women may be common in the U.S.,[1] it seems untoward that a profession that embraces equity as a cornerstone of medical practice quality[24] should be tolerant of gender-based inequity in pay. Female ophthalmologists have achieved the same level of education, have made the same time commitment to training, and have experienced the same direct and opportunity costs required of such commitment[25] as their male counterparts. Additional efforts to elucidate the underlying causes of any salary differences—including determining whether female physicians have dif-

ferent preferences regarding practice characteristics within specialties that might warrant lower incomes—and to suggest remedies are warranted.

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Table 2. Coefficients in the Regression Model (Weighted $N = 624$)

	Coefficient	95% Confidence Intervals	*P* Value
Physician work effort			
Total annual visits	$24.55	$19.05–$30.04	<0.001
Total annual hours worked	−$20.01	−$38.30 to −$1.73	0.03
Provider characteristics			
Years in medical practice (5–10 is referent)			
<5	−$32 794	−$89 298 to $23 711	0.3
10–15	−$20 030	−$53 442 to $13 382	0.2
15–20	−$12 746	−$46 395 to $20 903	0.5
20–25	−$33 147	−$71 931 to $5636	0.09
25–30	−$31 367	−$69 802 to $7068	0.11
30–35	−$91 609	−$140 889 to −$42 328	<0.001
35–40	−$50 499	−$115 484 to $14 486	0.13
≥40	−$144 786	−$299 591 to $10 019	0.07
Ownership interest and board certification			
Physician is an employee	−$37 484	−$65 915 to −$9053	0.01
Physician is board certified	$51 404	$15 781–$87 027	0.005
Practice characteristics			
Census region of practice (northeast is referent)			
North central	$15 008	−$17 874 to $47 889	0.4
Southern	−$20 046	−$48 168 to $8077	0.2
Western	−$14 963	−$45 882 to $15 957	0.3
Practice setting (population greater than 500,000 is referent)			
<50 000 population	$4620	−$35 202 to $44 443	0.8
Population between 50 000 and 500 000	−$4230	−$28 813 to $20 353	0.7
Service population			
1% increase in patient population on Medicaid	−$488	−$1617 to $641	0.4
Proportion providing Medicare services	$84 814	$4755–$164 873	0.04
Gender (male is referent)			
Female	−$55 091	−$93 611 to −$16 572	0.005

Adjusted R^2 for the model = 0.21.