ORIGINAL ARTICLE

Geographic Variation in Gender Disparities in the US Radiologist Workforce

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Abstract

Purpose: To assess geographic variation in gender disparities in the US radiologist workforce.

Methods: Gender, location, and practice affiliation of all radiologists and gender of all nonradiologists were identified for all providers listed in the Medicare Physician Compare database. Variation in female representation among radiologists was summarized at state, county, and individual practice levels, and associations with a variety of county-level population characteristics were explored.

Results: Nationally, 23.1% (7,501 of 32,429) of all radiologists were women versus 46.6% (481,831 of 1,034,909) of Medicare-participating nonradiologists. At the state level, female representation among radiologists was overall highest in the Northeast and Mid-Atlantic regions (Washington DC, 39.3%; Massachusetts, 34.3%; Maryland, 31.5%) and lowest in the West and Midwest (Wyoming, 9.0%; Montana, 10.7%; Idaho, 11.7%). At the county level, female representation varied from 0.0% to 100.0%, with weak positive correlations with county-level population ($r = +0.39$), median household income ($r = +0.25$), college education ($r = +0.23$), English nonproficiency ($r = +0.21$), mammography screening rates ($r = +0.12$), Democratic voting in the 2016 presidential election ($r = +0.28$), and weak negative correlation with county-level rural population percentage ($r = -0.32$). Among practices with ≥10 members, female representation varied greatly (0.0% to 100.0%). Female representation was higher among academic (32.3%) than nonacademic (20.6%) radiologists, and in states with higher female-to-male relative earnings ($r = +0.556$).

Conclusion: Compared with nonradiologists, women are underrepresented in the national radiologist workforce. This underrepresentation is highly variable at state, county, and practice levels and is partially explained by a variety of demographic, socioeconomic, and political factors. These insights could help inform and drive initiatives to reduce gender disparities and more actively engage women in the specialty.

Key Words: Gender, diversity, disparities, radiologist workforce, Medicare

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INTRODUCTION

A variety of voices and forces has heightened awareness of disparities in the US physician workforce and has prompted initiatives to more actively promote enhanced gender, racial, and ethnic representation. Diversity among health care practitioners is important for representing the increasingly diverse US patient population they serve [1]. In addition, diversity provides a broad range of experiences and perspectives that can translate to higher levels of performance [2,3]. Furthermore, diversity is a source of innovation and creativity in problem solving [4]. An aspect of workforce diversity and inclusion that has received particular focus in health care is physician gender. Currently, women represent nearly one-half of the nation's medical students [5], and robust female representation among physicians has been deemed important for fostering optimal health outcomes for female patients [6].

Radiology, however, has a long-standing history of having among the lowest female representation among all medical specialties [7]. Prior works have revealed that women represent only 22% to 24% of radiologists practicing in the United States [8,9] and that this rate

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has failed to increase over time [8]. Although underrepresentation of women in radiology is a global issue, among 26 different countries recently studied, female representation in the United States was the lowest [10]. As such, improving female representation among radiologists has become a priority of numerous national specialty societies [4,11,12]. Understanding factors contributing to disparate female representation could help inform initiatives to more successfully address gender barriers.

Prior surveys have explored variation in female representation among radiologists based on radiologist characteristics, such as subspecialty and career stage [13,14], as has a recent study using Medicare claims and enrollment data [15]. But, it is also plausible that female representation among radiologists varies based on characteristics at the local nonradiologist population level and could be related to regional demographic, socioeconomic, and political factors. For these reasons, we conducted this study to assess and characterize geographic variation in gender disparities in the US radiologist workforce.

METHODS

This study using publicly available data sets not containing private identifiable information does not represent human subject research and thus did not require oversight by our Institutional Review Boards.

The January 4, 2018, update of the Physician Compare National Downloadable File was obtained from CMS [16]. This database provides a list of all health care providers registered with the Medicare system. All providers with a primary specialty of diagnostic radiology, interventional radiology, or nuclear medicine (hereafter referred to as "radiologists") and located in any of the 50 states or Washington, DC, were identified. Radiologists' gender, state of practice, primary zip code of practice, and primary group practice identifier were obtained from Physician Compare. Each zip code was then mapped to a specific county using a crosswalk file from the US Department of Housing and Urban Development [17].

The percentage of female representation was determined for all radiologists nationally. The percentage of female representation was also computed for all nonradiologist health care providers in Physician Compare with a listed gender. Given earlier work demonstrating greater female representation among primary care physicians and lower representation among surgeons [18], female representation was additionally determined for selected primary care (internal medicine, family practice) and surgical specialties (general surgery, vascular surgery) for comparative purposes. Average percent female representation among radiologists was then calculated at all state and county levels and depicted visually using choropleth maps (www.openheatmap.com).

The 2017 County Health Rankings National Data file prepared by the University of Wisconsin and the Robert Wood Johnson Foundation was accessed [19]. This file provides county-level statistics for a broad range of demographic and socioeconomic measures. The file was used to extract counties' percentage of female population, rural population, unemployed, uninsured, median household income, total population, those not proficient in English, with some college schooling, and mammography screening rate (among women aged 67-69 years). As a surrogate of county-level political distribution, the percentage of the population that voted Democrat in the 2016 presidential election was determined using recent county-level election data [20]. The earnings ratio for females in 2016 (defined as the ratio between women and men in terms of median annual earnings for full-time year-round workers) was determined for each state using data recently reported by the American Association of University Women [21].

The percentage of female representation was computed for all cohort radiology practices with at least 10 members. Practices' city locations were extracted from Physician Compare and summarized descriptively for those outlier practices with (1) no female members and (2) those with 50.0% or greater female members. Group practice identifiers were also used to classify radiologists as academic or nonacademic using data from the ACGME [22] in a manner similar to that previously described [23]. Based on this methodology, the percentage of female representation was also computed among academic and nonacademic radiologists.

Categorical variables were compared between groups using χ^2 tests. Spearman correlation coefficients were calculated between the percentage of female representation among radiologists at state and county levels and the extracted state and county characteristics. Multivariable linear regression of the county characteristics was performed to identify significant independent predictors of the percentage of female representation among radiologists. Analysis was performed using MedCalc software (MedCalc for Windows; Ostend, Belgium).