

## ORIGINAL RESEARCH

# Regional distribution in female representation in US otolaryngology faculty

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## Abstract

**Objectives:** To quantify the current proportion of women in otolaryngology at different levels of professorship and determine whether these proportions differ by US region.

**Methods:** Academic rank and gender at all ACGME-accredited otolaryngology programs in the United States were determined from departmental websites, Doximity, and LinkedIn from November 2021 to March 2022. Individuals were then further organized using US Census Bureau-designated regions.

**Results:** Among the 2682 faculty positions at 124 ACGME-accredited programs, women held 706 (26.3%) of these positions. Female representation was highest at the assistant professorship level, with women holding 286 (37.2%) positions out of a total 769. At the associate professorship level, women held 141 (27.6%) of the 511 total positions. The largest gender disparity is seen at the full professorship level; only 69 (13.6%) positions out of 508 were held by women. Out of every region and rank, only assistant professorship in the West had no significant difference in percentages of men and women ( $p = .710$ ). Female representation of professors in the Northeast was significantly lower than that of our reference group (the South;  $\beta = -10.9$ ,  $p = .020$ ).

**Conclusions:** Otolaryngology has exhibited great progress in increasing female representation, with assistant professorship in the West reaching gender parity. However, the gender gap at other faculty levels still leaves much to be desired, particularly in senior ranks. The lack of otolaryngologists at senior ranks is detrimental to mentorship of junior faculty, residents, and medical students. Renewed efforts should be made to decrease the gender disparity in the South, Northeast, and particularly at the professorship level.

## KEYWORDS

diversity, female representation, gender inequity, otolaryngology faculty, workforce

## 1 | INTRODUCTION

This work was presented in part as a poster presentation at the Triological Society 124th Annual Meeting, April 27–May 1, 2022 in Dallas, Texas.

Female representation in medical schools has reached historical heights, with women comprising the majority (50.5%) of US medical

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students in 2019.<sup>1</sup> However, at the physician level, there remains a large gender gap. In the AAMC's 2018–2019 report on academic medicine, despite making up 41% of all MDs, women only accounted for 25% of all full professors and 37% of all associate professors.<sup>2</sup> This gender gap is particularly notable when narrowed to include only surgical specialties. In 2019, only 9.3% of neurosurgeons, 5.8% of orthopedic surgeons, 17.2% of plastic surgeons, and 8.0% of thoracic surgeons were female.<sup>3</sup> Thus, although advances in gender equality are promising, surgical specialties are still far from reaching acceptable levels of female representation.

Otolaryngology has exhibited remarkable progress in gender parity. The gender gap has narrowed significantly from being 6% female in 1998 to the current-day percentage of 18.3%.<sup>3,4</sup> Promisingly, the residents entering the workforce in the next few years are set to narrow this gender gap even further, with women comprising 35.86% of otolaryngology residents at the 20 largest specialty training programs. Based on this estimation, Bennett et al.<sup>5</sup> calculated that otolaryngology will require 19 years to reach gender parity with the US population.

Despite these trends towards gender equality early in the career pathway, women comprise a smaller proportion of academic senior faculty and hold disproportionately fewer leadership roles. Women held only 18.6% of directorships, 5.1% of chair positions, and 26.4% of full professorships. Furthermore, women had significantly lower research productivity.<sup>6</sup> In line with this study, females were under-represented on eight of the nine otolaryngology journals with the highest impact factors.<sup>7</sup> As a possible explanation for these findings, a longitudinal study from 2000 to 2015 found that the proportion of female senior authors has not changed significantly for journals with impact factors over 2.<sup>8</sup> Research is a vital component in consideration of faculty promotion at most academic institutions; such inequities in publication could explain the inequities of otolaryngology leadership positions.

Two main hypotheses exist that attempt to explain the enduring gender gap at all levels of academia. First, a lack of current female mentors at the upper faculty ranks in otolaryngology discourages women from joining academia and the overall specialty. Programs with a high percentage of women on faculty were shown to have more female residents.<sup>9</sup> Women who have attained professorship would be better able to promote their mentees when opportunities arise. Second, women report concerns about work-life balance, especially balancing childbearing and rearing with a surgical career. Forty-four percent of five hundred and thirty-five Women in Otolaryngology members felt that their department leaders were not supportive of women starting families while in training.<sup>10</sup> Female otolaryngologists also have children later in life, with nearly a third reporting diagnosed infertility; most indicated that they would have attempted conception earlier in retrospect.<sup>11</sup>

Given the under-representation of women in senior-level faculty appointments within otolaryngology and increased representation in the pipeline entering the workforce, our aim was to determine the current proportion of women in otolaryngology at different levels of professorship. Furthermore, given geographical gender differences shown in other fields,<sup>12,13</sup> we sought to analyze regional trends in

**TABLE 1** US Census Bureau region designations.

| Regions   | States   |
|-----------|--|
| West      | Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, New Mexico, Nevada, Oregon, Washington, and Wyoming   |
| Northeast | Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont  |
| Midwest   | Kansas, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, North Dakota, Nebraska, Ohio, South Dakota, and Wisconsin  |
| South     | Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia |

female representation among otolaryngologists in the United States in the hopes of elucidating factors that may explain gender differences in academic otolaryngology. Such regional variance could portend progress in gender equity and hint at successful gender diversity initiatives that should be adopted by other regions and programs. This information would also inform new applicants and trainees of regions that hold the most potential for female mentorship and sponsorship.

## 2 | MATERIALS AND METHODS

A cross-sectional study was performed using a comprehensive list of otolaryngology residency programs accredited by the Accreditation Council for Graduate Medical Education was compiled using the American Medical Association's Fellowship and Residency Interactive Database.<sup>14</sup> The list included 123 programs in the United States from 2020 to 2021.

Esther Wang, Ashley Diaz, and Maha L. Khan examined faculty listings on departmental websites of the 123 programs and recorded information on faculty rank from November 2021 to March 2022. Inclusion criteria were: faculty listed on departmental websites and/or Doximity, available faculty rank, residency training in otolaryngology. Exclusion criteria were faculty who were clinical affiliates with no listed faculty rank, programs in unincorporated US territory. For each hospital-official website, Esther Wang, Ashley Diaz, and Maha L. Khan clicked into each listed individuals' profile and confirmed that their profile agreed with our inclusion/exclusion criteria. Information from these profiles regarding sex (male or female)—using listed pronouns in their biography—and academic rank (instructor, assistant professor, associate professor, and full professor) were gathered. If these data were unobtainable using departmental websites, Doximity (an online national network and database of physicians) was used as a complementary resource. The number of individuals and faculty ranks on each departmental website was cross-referenced for accuracy by Esther Wang and Ashley Diaz. Faculty members were then further organized by institutional location found on Google Maps using US Census Bureau designated regions and divisions (Table 1).

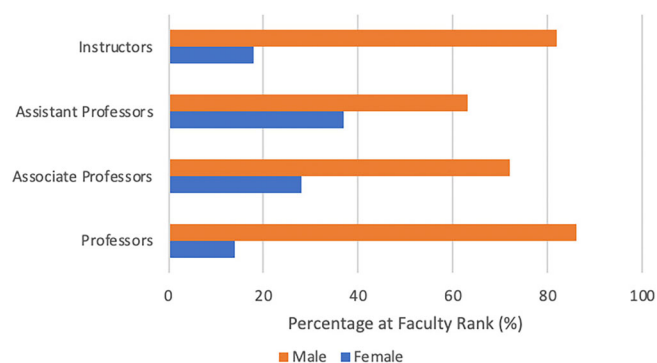
Descriptive statistics, such as means, standard deviations, and proportions, were calculated. Separate *t*-tests were used to determine statistical differences in the mean of all percentages of men and women comprising their institutional department for every individual region and for each faculty rank. Linear regression was used to determine statistical difference in proportion of females across the four regions at each rank. For our reference group, we used the region with the lowest female representation overall, the South. This regression model examined the proportion of women in academic otolaryngology in the West, Midwest, and East as compared with that in the South.

The *p*-values < .05 were considered significant. Excel and GraphPad Prism 9 were used to conduct analyses. The study was given exemption status by the Institutional Review Board of the University of Chicago given that all information obtained was open-access knowledge and patients were not involved.

This study was exempted from Institution Review Board review, as all data were publicly available and no patient data were required.

### 3 | RESULTS

We found gender data on faculty for 119 of the total 123 ACGME-accredited programs in the United States from 2020 to 2021. Twenty-seven programs did not have professorship rank information on their faculty page. One program, the University of Puerto Rico, was excluded from region analyses as it did not belong to any of the four main regions of the United States.



**FIGURE 1** Distribution of faculty rank in men and women in academic otolaryngology. Males hold the majority of positions for every faculty rank. The largest proportion of females holding directorship positions are assistant professors.

Women held 26.3% (706/2682) of all otolaryngology faculty positions in ACGME-accredited programs. Breaking this number down by faculty rank, female otolaryngologists accounted for 13.6% (69/508) of otolaryngologists with full professorship, 27.6% (141/511) of those with associate professorship, 37.2% (286/769) of those with assistant professorship, 18.3% (30/164) of clinical instructors, and 27.2% (113/415) of those with unspecified positions (Figure 1).

From highest to lowest, the level of female representation in overall faculty by region is as follows: West (30.3%, 122/402); Northeast (27.3%, 139/510); Midwest (26.2%, 117/447); South (24.9%, 103/413; Table 2). There was significant male predominance in overall faculty in every individual region of the United States ( $p < .001$  for all regions; Figure 2A). Using the South as the reference group, the percentage of women on faculty did not differ significantly by region (Table 3).

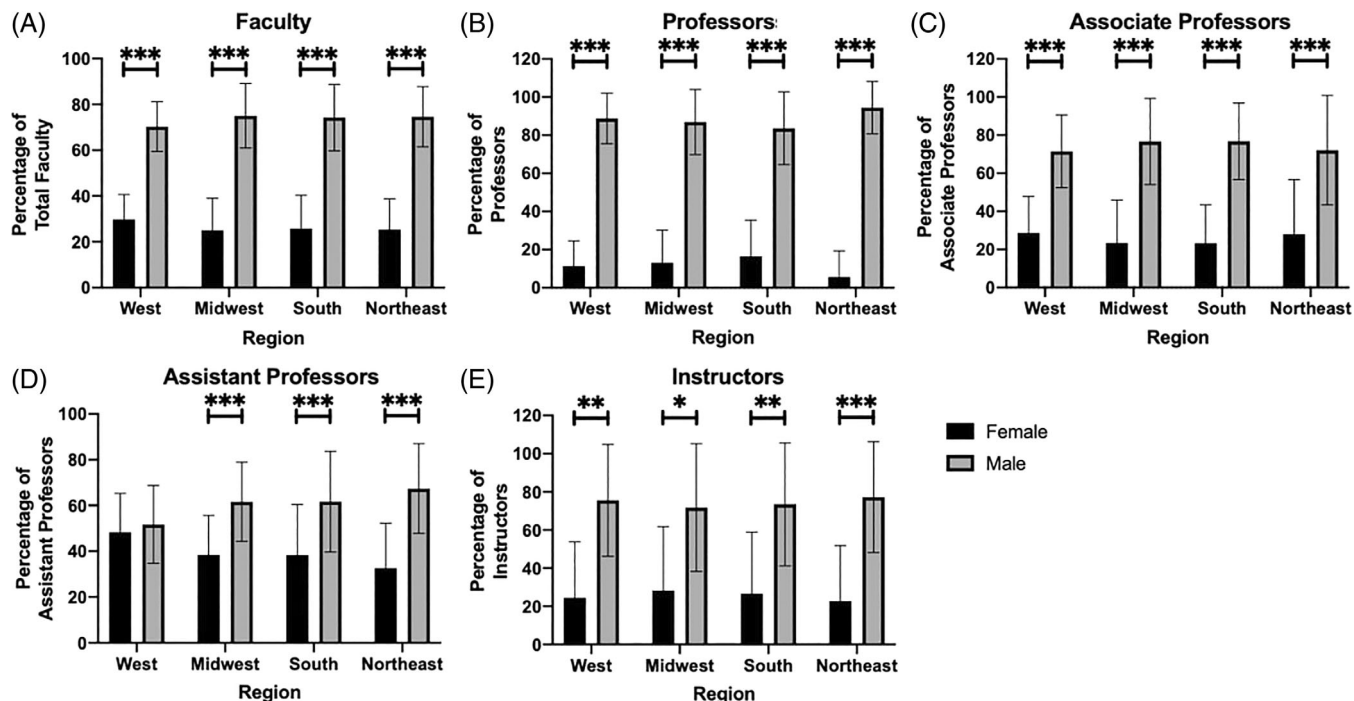
Across all ranks of faculty, otolaryngologists at the professor level showed the least female representation: Midwest (15.2%, 13/89); West (14.6%, 13/89); South (13.6%, 14/103); Northeast (8.8%, 8/91; Table 2). For each region individually, the percentage of male otolaryngologists was significantly higher than that of female otolaryngologists ( $p < .001$  for all regions; Figure 2B). However, when comparing female representation across the different geographical regions, the percentage of female otolaryngology professors in the Northeast was significantly less than that of the reference group, the South ( $\beta$ -coefficient =  $-10.9$ ,  $p = .020$ ). The Midwest and West did not reach statistically significant differences (Table 3).

From highest to lowest, the level of female representation in associate professorship is as follows: West (31.3%, 26/83); Northeast (28.4%, 29/102); Midwest (25.0%, 23/92); South (20.8%, 20/96; Table 2). As with the previous analyses, for each region individually, the percentage of male associate professors was significantly higher than female ( $p < .001$  for all regions; Figure 2C). Across geographic regions, the percentage of female associate professors did not differ significantly from the reference group, the South (Table 3).

Across all regions, female representation in assistant professorship was higher than at most other ranks: West (46.2%, 43/93); Northeast (35.0%, 57/163); Midwest (34.3%, 49/143); South (20.8%, 20/96; Table 2). Most interestingly, in the West, the difference between male and female assistant professor percentages was not significantly different ( $p = .710$ ; Figure 2D). In the Midwest, South, and Northeast, however, the trend of male predominance held true ( $p < .001$ ). Across geographic regions, the percentage of female otolaryngologist assistant professors did not differ significantly from the reference group, the South (Table 3).

|  | West       | Northeast  | Midwest    | South      |
|--|------------|------------|------------|------------|
| Overall Faculty, % women ( <i>n</i> )      | 30.3 (122) | 27.3 (139) | 26.2 (117) | 24.9 (103) |
| Professors, % women ( <i>n</i> )           | 14.6 (13)  | 8.8 (8)    | 15.2 (13)  | 13.6 (14)  |
| Associate Professors, % women ( <i>n</i> ) | 31.3 (26)  | 28.4 (29)  | 25.0 (23)  | 20.8 (20)  |
| Assistant Professors, % women ( <i>n</i> ) | 46.2 (43)  | 35.0 (57)  | 34.3 (49)  | 20.8 (20)  |
| Instructors, % women ( <i>n</i> )          | 16.2 (6)   | 21.2 (7)   | 25.0 (7)   | 21.4 (6)   |

**TABLE 2** Female otolaryngologists by geographic region and faculty rank.



**FIGURE 2** Percentages of men and women by geographic region in the United States by academic rank. Men were significantly more prevalent than women at every faculty rank in every region, with the exception of assistant professorship in the West (gender parity). \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .

**TABLE 3** Summary of linear regression models of percentage of female otolaryngologists by region.

| Regions             | Faculty | Professors | Associate Professors | Assistant Professors | Instructors |
|---------------------|---------|------------|----------------------|----------------------|-------------|
| Midwest vs. South   | -0.750  | -3.264     | 0.147                | 0.087                | 1.787       |
| Northeast vs. South | -0.438  | -10.897*   | 4.709                | -5.670               | -3.705      |
| West vs. South      | 3.890   | -5.111     | 5.458                | 9.992                | -2.077      |

\* $p < .05$ .

From highest to lowest, the level of female representation in clinical instructorship is as follows: Midwest (25.0%, 7/28); South (21.4%, 6/28); Northeast (21.2%, 7/33); West (16.2%, 6/37; Table 2). We observed significantly higher male prevalence in instructors (Midwest:  $p = .032$ ; South:  $p = .002$ ; Northeast  $p < .001$ ; West:  $p = .003$ ) (Figure 2E). Across geographic regions, the percentage of female otolaryngologist instructors did not differ significantly from the reference group, the South (Table 3).

#### 4 | DISCUSSION

In this study, we found that female representation in otolaryngology faculty across the United States is disproportionately low, especially in the upper ranks of professorship. When parsed by region, only assistant professorship in the West reached gender parity, with 46.2% of all assistant professors being female. Of note, only one statistically significant difference in regional analysis was found with the South as a reference group; the Northeast had a lower percentage of female

otolaryngology professors. Other than this finding, no differences were found in female representation across the four regions of the United States.

Disparities have been noted between genders early in medical careers. Female medical students were less likely to aspire to a surgical specialty than their male counterparts.<sup>15,16</sup> Several studies have noted that female medical students were discouraged from interest in surgical specialties by a lack of female role models,<sup>17,18</sup> and that their choice of a surgical specialty was directly proportional to higher proportion of female surgeons at their schools.<sup>17</sup> A review of 122 primary articles found that gender is one of the 3 core concepts that affect medical students' decision to go into a surgical specialty.<sup>19</sup>

The effects of gender are mirrored in the resident population. From 2008–2012 to 2013–2018, the percentage increase in female otolaryngology residents was only 6.1%, bringing the total to 35.9%.<sup>20</sup> 87% of female residents stated that having 1 female attending and having female coresidents was “very important” or “important.”<sup>21</sup> The effect of having female mentors and role models in the otolaryngology departments cannot be underestimated.

Furthermore, we found that female representation in clinical instructorship is worse than in both associate and assistant professorship. Several large institutions indicate that clinical instructorship is an entry-level rank, with some indicating its use for advanced specialty trainees.<sup>22,23</sup> As such, our finding that only 18% of clinical instructors are female suggest that there is a lower percentage of women entering academic otolaryngology and pursuing fellowship positions. This could explain the slow progress toward gender parity at academic institutions despite increased female representation in residencies.

Though the overall percentages of female otolaryngologists in all regions are disheartening, we find hope in the female representation at the assistant professorship level. The West reached statistical gender parity, and percentages of women in the Midwest and Northeast were higher than at any other rank. Combined with increased female representation in residency programs,<sup>5</sup> our findings indicate that, slowly but surely, more women are entering the career pipeline and moving up the academic ladder in otolaryngology.

We hypothesize that the West has high female representation at all ranks of professorship due to positive feedback. The West had the highest percentage of female associate professors (31.3%) and the second highest percentage of female professors (14.6%). Programs with higher female faculty representation were more likely to have greater female representation among residents as well.<sup>9</sup> These residents often stay on as faculty at their training institutions.<sup>24</sup> We hypothesize that, due to more women moving through the academic pipeline in institutions in the West, more female residents choose to train in the West and stay as junior faculty. Further study and investigation will be needed to understand why the West is closer to gender parity than all other regions.

Our results corroborate previous findings on regional differences. In 2013, Eloy et al.<sup>25</sup> found that men attained higher senior academic ranks compared with women, and that regional gender differences in the senior faculty were highest in the South and Northeast. Nearly 8 years later, these regional differences still hold true. At the professorship level, the South and Northeast still had the lowest female representation. The South had the lowest female representation in overall faculty and at the associate and assistant professorship levels. Despite no statistically significant difference, the percentage of female assistant professors in the South was 14% less than the next closest region, the Midwest. In contrast, the Northeast now has the second highest percentage of women at the associate and assistant professorship levels. This may indicate more efforts in the Northeast to recruit female otolaryngologists to the junior faculty since 2013.

Taken together, the results of these analyses indicate that the West is closest to gender parity in terms of overall female faculty, associate professorship, and assistant professorship. However, the representation of women at the highest levels of faculty, professorship, and associate professorship, is still lacking across all regions. Why does this discrepancy still exist?

Several theories for this discrepancy in full-time faculty and leadership positions have been posed. One thought is that the expectation of women to bear a greater share of childrearing, household chores,

and meal planning in addition to full-time work makes obtaining promotions more difficult.<sup>26</sup> Grandis et al.<sup>27</sup> found that in a sample of 673 otolaryngologists, women were more likely to reduce their work hours to accommodate for children, and 34% of women (compared with 7% of men) spent 21–40 h/week on household management. However, with shifts in societal roles and culture,<sup>28</sup> we believe that this expectation will decrease, and calls for less gendered roles will permit increased accessibility in surgical specialties.

In the broader context of academic medicine, these trends are mirrored with the 2018–2019 AAMC report on Women in Medicine stating that while the overall proportion of full-time women faculty has continued to rise since 2009, women make up a majority of faculty only at the instructor rank.<sup>29</sup> Equally as concerning, the report states that though there has been a steady rise in women department chairs over the past 10 years, women make up 18% of all department chairs nationally.<sup>2</sup> These trends are evidence that strategies to mitigate sexism within the field of medicine are essential for gender equality. Some strategies include awareness and education regarding implicit biases in the workplace, increasing mentorship and sponsoring of female trainee, and having concerted efforts to balance gender representations at conferences and academic presentations.<sup>30,31</sup> In addition, recent research has expanded on the important role of female mentorship and role models at the higher levels of academia.<sup>32</sup> As women face unique challenges in promotion and work-life balance, having a female mentor who has worked through the same challenges to guide the way, especially in a high-intensity career like otolaryngology, will allow them smoother and easier career development.<sup>33,34</sup> As women are represented more and more in otolaryngology, we believe that the opposite will happen; increased female representation at higher levels will smooth the path for the next generations of female otolaryngologists. For these reasons, we are optimistic about increased female representation in otolaryngology.

Finally, despite the Equal Pay Act, there still exists a gender pay gap in surgery. According to the 2019 Medscape Physician Compensation Report, female specialists earned 33% less than males.<sup>35</sup> In indirect contributors to this pay gap, women are assigned more unpaid work for the institution and are less likely to seek assistance when in distress.<sup>36</sup> For academic otolaryngology specifically, women reported earning \$35,000 less than their male counterparts at the same faculty rank.<sup>27</sup> All of these factors may explain the persistence of gender disparity in otolaryngology.

Several limitations of our study related to the use of departmental websites and Doximity to acquire faculty profiles, gender, and rank. Out of the 123 programs, 4 did not have any information regarding faculty, and 27 had overall faculty pages but no ranks. The majority of military programs did not have information about their faculty. Another related limitation is that we relied solely on these two resources to find gender and rank information. Despite our best efforts to cross-check information between the two, we may have been unaware if physicians had moved or left the hospital if the websites were not updated. Absence of such data from particular programs may influence our findings of female representation in different regions.

## 5 | CONCLUSION

In every faculty rank of each individual region of the United States, the percentage of female otolaryngologists was significantly lower than that of male otolaryngologists; only one reached statistical gender parity—assistant professorship in the West. The disparity was most pronounced at the professorship level, specifically in the Northeast where the percentage of female professors was only 8.8%. These findings suggest a need to better understand and address the gender barriers to women in academic otolaryngology that exist in every region but are most pronounced in the South overall and in the senior faculty of the Northeast.

### CONFLICT OF INTEREST STATEMENT

The authors have no disclosures to make.

### DATA AVAILABILITY STATEMENT

Data are available on request from the authors.

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