# Changes in dermatology practice characteristics in the United States from 2012 to 2017

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***Background:*** Dermatology practice has recently seen multiple changes. A better understanding of trends pertaining to dermatology practice setups is necessary.

***Objective:*** To analyze the recent changes in dermatology practice in terms of geography, practice size, and gender distribution as well as to analyze the availability of dermatologists based on zip codes' income levels.

***Methods:*** This was a cross-sectional study. We extracted data on the sex and billing addresses of dermatologists from Medicare provider utilization and payment data for 2012 and 2017. We used 2017 tax returns data to calculate the poverty level for each zip code.

***Results:*** Between 2012 and 2017, the number of solo practitioners decreased, while that of dermatologists working in large groups increased. The southern region experienced the largest changes. The male-to-female ratio decreased. Dermatology practices mainly comprised mixed genders, with a higher proportion of all-male groups versus that of all-female groups, but this difference decreased over time. In the northeastern and western regions, more than one third of dermatologists were located in the wealthiest zip codes.

***Limitations:*** The Medicare data may not be exhaustively representative of the dermatology workforce, and the zip codes of 489 dermatologists' billing addresses were missing in the tax return dataset.

***Conclusions:*** These findings provide an understanding of the recent changes pertaining to dermatology practice setups and of the substantial health care disparities based on geographic distribution. (JAAD Int 2021;3:92-101.)

***Key words:*** dermatology practice; healthcare disparities; practice consolidation; practice distribution; public health.

## INTRODUCTION

Since the early 2000s, there have been projections that the physician workforce is smaller than what is needed for a growing and aging population.[1] The increasing incidence of skin cancer and inflammatory disorders as well as an improved understanding of skin photoaging have led to a fast-growing demand for dermatologic care that was persistently unmet.[2,3] Dermatology practices have also sustained structural changes in the last decade with the increasing consolidation of practices through private equity acquisitions.[4,5] Dermatologists are increasingly being drawn toward working in large groups rather than starting their own practices.[6]

Some concerns regarding the corporatization of medicine have been expressed, such as the

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perpetuation of disparities in the health care system.[7] As evidenced by multiple reports, health care inequities based on socioeconomic factors and their consequences are increasingly being recognized in the field of dermatology.[8,9] For instance, despite the higher incidence of melanoma in higher-income populations, patients from lower-income populations are more likely to present with late-stage disease.[10] Similarly, previous data have suggested that racial minorities have more severe psoriasis and, consequently, a poorer quality of life.[11]

An adequately prepared dermatology workforce is, therefore, necessary to meet the current and future needs of our patients. To achieve that, a better understanding of our workforce and the changes pertaining to dermatology practice setups and distribution are required. Prior reports on dermatology workforce patterns relied on surveys.[3,6] These studies were potentially limited by a sampling bias, a response bias, and inaccurate self-reporting. To better quantify and track workforce distribution and practice patterns, we used the billing addresses of dermatology providers for Medicare patients in 2012 and 2017 to analyze the most recent longitudinal trends in the geographic and demographic distributions of dermatologists based on practice size, sex of the providers, and income levels of the zip codes in which the practices were located.

**CAPSULE SUMMARY**

- The new challenges faced in dermatology practice include increasing shortage of dermatologists, consolidation of practices, and concerns over health care disparities based on socioeconomic factors.
- These findings provide an understanding of recent changes pertaining to dermatology practice setups and of substantial variations in geographic distribution.

## METHODS

This was a cross-sectional study. To evaluate the change in geographic distribution, practice size, and gender distribution in dermatology practices, we queried publicly available Medicare datasets to identify practicing physicians. We collected Medicare provider utilization and payment data for the calendar years 2012 and 2017. Providers with a self-reported specialty in dermatology were selected.

Data on the sex and billing address of each dermatologist were extracted. Based on their billing address, the dermatologists were categorized into 1 of the following 4 regions: Northeast (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont, New Jersey, New York, and Pennsylvania), Midwest (Indiana, Illinois, Michigan, Ohio, Wisconsin, Iowa, Nebraska, Kansas, North Dakota, Minnesota, South Dakota, and Missouri), South (Delaware, District of Columbia, Florida, Georgia, Maryland, North Carolina, South Carolina, Virginia, West Virginia, Alabama, Kentucky, Mississippi, Tennessee, Arizona, Louisiana, Oklahoma, and Texas), and West (Arizona, Colorado, Idaho, New Mexico, Montana, Utah, Nevada, Wyoming, Alaska, California, Hawaii, Oregon, and Washington) according to the United States (US) Census Bureau's regional classification. We used the US Census Bureau data on population growth based on the region to calculate the density of dermatologists per 100,000 people. A group of dermatologists with the same billing address was considered as a dermatology practice. Dermatology practices were divided into subgroups based on the number of dermatology providers within the practice: solo (1), small (2-5), medium (6-10) and large (>10).

We used 2017 tax returns data published by the Internal Revenue Service to calculate the poverty level of each zip code, defined as the proportion of the number of tax returns in the lowest income bracket of $25,000 or less among the total number of tax returns for that particular zip code.[12] We categorized the zip codes into quintiles based on the poverty level.

The data were transferred from an Excel sheet to a statistical programming software, R (version 3.6.1). We investigated changes in dermatology practice based on geographic region, practice size, and gender distribution over time. For this, we identified the number of dermatologists and the number of practices and analyzed the distribution of dermatology practices based on practice size and gender composition nationwide and in each of the 4 regions of the US in 2012 and 2017. We also analyzed the distribution of dermatologists based on the poverty level quintiles according to their billing addresses listed in the Medicare provider utilization and payment data for 2017.

## RESULTS

### Geographic distribution

From 2012 to 2017, the number of dermatologists increased by 6%, while the number of practices increased by only 3%. This increase was homogeneous across the US census regions.

The northeastern region had the highest density of dermatologists compared with the western, Midwest, and southern regions (Table I).

### Practice size distribution

In 2017, solo and small (2-5 providers) practices accounted for more than 80% of dermatology practices. However, there were almost twice as many dermatologists in large groups (2626) than there were in solo practice (1427). The number of solo practitioners decreased by 1%, while the number of dermatologists working in large groups (>10 providers) increased by 12% nationwide. Similarly, the number of large groups increased by 12%. No remarkable change in the average practice size was observed (3.1 in 2012 vs 3.2 in 2017).

An analysis of regional distribution showed that the southern region had the lowest proportion of large group practices and of dermatologists in large groups. However, it also experienced the largest decrease in the number of solo practices (−5%) and a concomitant rise in the number of large practices (+26%) and dermatologists working in large practices (+21%) (Table II).

### Gender distribution

The male-to-female ratio was 1.3 (57% men vs 43% women) in 2012 compared with 1.1 (52% men vs 48% women) in 2017.

From 2012 to 2017, the number of female dermatologists in solo practices increased by 12%, whereas the number of male dermatologists decreased by 8%.

Both the proportions of women and men working in solo practices decreased over time; however, a lower proportion of women (10%) than that of men (15%) were solo practitioners.

In group practices, the average percentage of male providers per practice decreased (from 58% to 54%), while that of female providers increased (from 42% to 46%). Mixed-gender practices were the most represented among dermatology practices (70%). All-male group practices were more frequent than all-female group practices. However, the difference decreased over time, with the number of all-female practices increasing by 25% and that of all-male practices decreasing by 14% (Table III).

### Distribution based on zip codes' income level

The distribution of dermatologists based on the zip codes' income level showed that almost half of all dermatologists nationwide (48%) work in the 2 lowest poverty level quintiles, while 18% of the dermatologists work in the highest poverty level quintile.

**Table I.** Geographic distribution of dermatologists and dermatology practices

| Region | Nationwide | | | Northeast | | | Midwest | | | South | | | West | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % |
| Number of dermatologists | 10,374 | 11,003 | +6 | 2370 | 2465 | +4 | 2021 | 2121 | +5 | 3616 | 3887 | +7 | 2316 | 2479 | +7 |
| | | | | 23% | 22% | | 19% | 19% | | 35% | 35% | | 22% | 23% | |
| Density of dermatologists per 100,000 people | 3.31 | 3.39 | +2 | 4.24 | 4.39 | +4 | 2.99 | 3.11 | +4 | 3.05 | 3.14 | +3 | 3.13 | 3.21 | +3 |
| Number of practices | 3334 | 3432 | +3 | 716 | 740 | +3 | 676 | 697 | +3 | 1187 | 1217 | +3 | 724 | 748 | +3 |
| | | | | 21% | 22% | | 20% | 20% | | 35% | 35% | | 22% | 22% | |

**Table II.** Distribution of dermatology practice based on practice size

| Region/year | Nationwide | | | Northeast | | | Midwest | | | South | | | West | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % |
| Number of practices with the following practice size | | | | | | | | | | | | | | | |
| 1 (solo) | 1446, 43% | 1427, 42% | −1 | 316, 44% | 330, 45% | +4 | 316, 47% | 306, 44% | −3 | 488, 41% | 461, 38% | −5 | 308, 42% | 311, 42% | +1 |
| 2-5 | 1425, 43% | 1518, 44% | +7 | 296, 41% | 306, 41% | +3 | 274, 41% | 301, 43% | +10 | 524, 44% | 571, 47% | +9 | 318, 44% | 330, 44% | +4 |
| 6-10 | 324, 10% | 332, 9% | +3 | 70, 10% | 68, 9% | −3 | 55, 7.5% | 58, 8% | +5 | 137, 12% | 137, 11% | 0 | 62, 9% | 68, 9% | +10 |
| >10 | 139, 4% | 155, 5% | +12 | 34, 5% | 36, 5% | +5 | 31, 4.5% | 32, 5% | +3 | 38, 3% | 48, 4% | +26 | 36, 5% | 39, 5% | +8 |
| Average practice size ± SD | 3.1 (3.9) | 3.2 (4.1) | | 3.3 (4.9) | 3.3 (5.2) | | 2.9 (3.9) | 3.1 (3.9) | | 3.1 (3.5) | 3.2 (3.5) | | 2.2 (3.7) | 3.3 (3.8) | |
| Number of dermatologists with the following practice size | | | | | | | | | | | | | | | |
| 1 (solo) | 1446, 14% | 1427, 13% | −1 | 316, 13% | 330, 13% | +4 | 316, 16% | 306, 14% | −3 | 488, 13% | 461, 12% | −5 | 308, 13% | 311, 13% | +1 |
| 2-5 | 4193, 40% | 4494, 41% | +7 | 867, 37% | 902, 37% | +4 | 796, 39% | 862, 41% | +8 | 1517, 42% | 1679, 43% | +10 | 980, 42% | 1026, 41% | +5 |
| 6-10 | 2403, 23% | 2456, 22% | +2 | 531, 22% | 519, 21% | −2 | 399, 20% | 415, 20% | +4 | 1009, 28% | 1016, 26% | +1 | 464, 20% | 499, 20% | +7 |
| >10 | 2346, 23% | 2626, 24% | +12 | 655, 28% | 714, 29% | +9 | 511, 25% | 538, 25% | +5 | 602, 17% | 731, 19% | +21 | 578, 25% | 643, 26% | +11 |

*SD*, Standard deviation.

**Table III.** Distribution of dermatology practice based on sex

| | Nationwide | | | Northeast | | | Midwest | | | South | | | West | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Region/year | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % | 2012 | 2017 | Change % |
| Solo practice | | | | | | | | | | | | | | | |
| Number of male dermatologists % | 945, 65% | 867, 61% | −8 | 205, 65% | 199, 60% | −3 | 199, 63% | 175, 57% | −12 | 326, 67% | 277, 60% | −15 | 207, 67% | 205, 66% | −1 |
| Number of female dermatologists % | 501, 35% | 560, 39% | +12 | 111, 35% | 131, 40% | +18 | 117, 37% | 131, 43% | +12 | 162, 33% | 184, 40% | +14 | 101, 33% | 106, 34% | +5 |
| Group practice | | | | | | | | | | | | | | | |
| Number of male dermatologists % | 5000, 58% | 4872, 54% | −2 | 1327, 56% | 1282, 52% | −4 | 1172, 58% | 1082, 51% | −8 | 2133, 59% | 2138, 55% | +0.2 | 1413, 61% | 1363, 55% | −4 |
| Number of female dermatologists % | 3928, 42% | 4704, 46% | +20 | 1043, 44% | 1183, 48% | +13 | 848, 42% | 1039, 49% | +22 | 1483, 41% | 1749, 45% | +18 | 903, 39% | 1116, 45% | +24 |
| Group diversity | | | | | | | | | | | | | | | |
| Mixed | 1302, 69% | 1432, 71% | +10 | 282, 70% | 291, 71% | +3 | 244, 68% | 273, 70% | +12 | 485, 70% | 547, 72% | +13 | 284, 68% | 316, 73% | +11 |
| All-female | 177, 9% | 222, 11% | +25 | 43, 11% | 51, 12% | +18 | 35, 10% | 51, 13% | +46 | 66, 9% | 75, 10% | +14 | 30, 7% | 41, 9% | +37 |
| All-male | 409, 22% | 351, 18% | −14 | 75, 19% | 68, 17% | −9 | 81, 22% | 67, 17% | −17 | 148, 21% | 134, 18% | −9 | 102, 24% | 80, 18% | −21 |

**Table IV.** Distribution of dermatologists based on zip codes' income level

| Region | Nationwide | Northeast | Midwest | South | West |
|---|---|---|---|---|---|
| Average poverty level | 0.3313 | 0.3005 | 0.3288 | 0.3479 | 0.3042 |
| Number of dermatologists based on poverty level quintiles | | | | | |
| 0-19th (richest) | 2886, 28% | 919, 38% | 395, 20% | 736, 20% | 836, 35% |
| 20-39th | 2077, 20% | 524, 22% | 425, 21% | 576, 16% | 552, 23% |
| 40-59th | 1914, 18% | 364, 15% | 423, 21% | 693, 19% | 434, 18% |
| 60-79th | 1718, 16% | 279, 12% | 388, 19% | 721, 19% | 330, 14% |
| 80-99th (poorest) | 1919, 18% | 308, 13% | 384, 19% | 981, 26% | 246, 10% |

In the northeastern and western regions, where the average poverty level is the lowest, more than one third of dermatologists work in the lowest poverty level quintile (38% and 35%, respectively), representing more than triple the percentage of dermatologists working in the highest poverty level quintile (13% and 10%, respectively).

However, in the southern region, where the average poverty level is the highest, the trend is reversed, with 20% of dermatologists located in the lowest poverty level quintile zip codes versus 26% in the top poverty level quintile zip codes. In the Midwest, dermatologists are almost equally distributed across the zip codes with different poverty levels (Table IV).

The number of dermatologists, practice size, and female dermatologists' representation across the US states in 2017 are displayed in Table V.

This analysis included 10,514 of all dermatologists (96%) as some of the dermatologists' zip codes were missing from the Internal Revenue Service tax dataset.

## DISCUSSION

The objective of our study was to explore the trends in the geographic distribution, practice size, and gender distribution of dermatology practices from 2012 to 2017 and to evaluate the dermatologists' distribution based on the zip codes' income level within the US.

Our analysis revealed a 6% increase in the number of dermatologists during the study period, which was similar to an increase in the total number of active physicians (7.7% between 2010 and 2015) but higher than the numbers in other specialties, such as ophthalmology (3.6%), otorhinolaryngology (1.9%), and obstetrics and gynecology (2.7%).[13] According to a previous study, there was a 20.6% increase in the number of dermatologists between 1995 and 2013, roughly corresponding to a 1% yearly increase, which is consistent with our results.[14] This finding may be partially associated with an overall increase in the number of first-year medical school enrollments by almost 8% between 2012 and 2016.[15] Concomitantly, there was a continuous increase in the number of dermatology residency positions (9% between 2012 and 2016).[16]

During the study period, the northeastern region had the highest density of dermatologists in contrast to the Midwest, which had the lowest density. A study of the geographic characteristics of dermatology outpatients corroborated our results by showing that Midwestern patients are the least likely to visit a dermatologist, while Northeastern patients have the highest odds.[9] This trend was observed in a prior study, which found higher spatial accessibility for internal medicine providers in the Northeast.[17] Radiation oncologists and orthopedists also had a higher density in the Northeast.[18,19] A comparison of dermatologist density between urban and rural counties revealed a higher density of dermatologists in metropolitan areas.[14] This finding supports our results as the Northeast comprises the most populous and dense megapolitan areas in the US.[20]

The 6% increase in the number of dermatologists was paralleled by only a 3% increase in dermatology practices. This can be explained by a change in the practice size over time. Although the average practice size did not vary remarkably, there was a decrease in solo practices accompanied by an increase in group practices, especially large groups of more than 10 providers, which demonstrated the highest expansion (12%). The movement of dermatologists into groups is not a new phenomenon,[6] but our data suggest that the change involves mostly large practices. As the number of self-employed dermatologists decreased, the number employed in large groups increased. In 2017, there were almost twice as many dermatologists in large groups than there were in solo practice. In 2005, as many as 44% of dermatologists were solo practitioners.[21] This finding translates to a trend of dermatologists leaving

**Table V.** Dermatologists, practice size, and female dermatologists' representation across US states and territories in 2017

| States/territories | Number of dermatologists | Number of practices with the following practice size | | | | Female representation in solo practice | Female representation in group practice |
|---|---|---|---|---|---|---|---|
| | | 1 | 2-5 | 6-10 | >10 | | |
| Alabama | 15 | 6 | 1 | 1 | 0 | 33% | 61% |
| Alaska | 130 | 16 | 21 | 5 | 1 | 12% | 47% |
| Arizona | 227 | 23 | 28 | 8 | 4 | 30% | 39% |
| Arkansas | 64 | 11 | 11 | 0 | 1 | 27% | 28% |
| California | 1337 | 144 | 166 | 35 | 25 | 34% | 46% |
| Colorado | 211 | 28 | 29 | 6 | 3 | 50% | 55% |
| Connecticut | 163 | 20 | 29 | 2 | 3 | 45% | 53% |
| District of Columbia | 50 | 1 | 9 | 0 | 1 | 0% | 52% |
| Delaware | 27 | 7 | 4 | 1 | 0 | 14% | 45% |
| Florida | 919 | 101 | 136 | 44 | 6 | 34% | 40% |
| Georgia | 265 | 30 | 42 | 8 | 4 | 47% | 50% |
| Hawaii | 48 | 7 | 6 | 2 | 1 | 57% | 45% |
| Idaho | 42 | 11 | 8 | 1 | 0 | 18% | 19% |
| Illinois | 402 | 58 | 62 | 12 | 6 | 46% | 50% |
| Indiana | 154 | 26 | 27 | 4 | 1 | 46% | 48% |
| Iowa | 76 | 14 | 14 | 1 | 1 | 21% | 44% |
| Kansas | 67 | 17 | 10 | 1 | 1 | 35% | 48% |
| Kentucky | 122 | 15 | 12 | 4 | 3 | 27% | 45% |
| Louisiana | 176 | 18 | 25 | 5 | 2 | 50% | 55% |
| Maine | 35 | 11 | 5 | 0 | 1 | 64% | 48% |
| Maryland | 252 | 29 | 38 | 7 | 5 | 38% | 49% |
| Massachusetts | 407 | 44 | 34 | 12 | 9 | 41% | 53% |
| Michigan | 313 | 48 | 44 | 12 | 3 | 42% | 47% |
| Minnesota | 230 | 27 | 23 | 3 | 5 | 59% | 60% |
| Mississippi | 60 | 14 | 12 | 0 | 1 | 36% | 36% |
| Missouri | 192 | 23 | 25 | 5 | 3 | 43% | 47% |
| Montana | 26 | 4 | 5 | 1 | 0 | 25% | 49% |
| Nebraska | 40 | 5 | 10 | 1 | 0 | 20% | 42% |
| Nevada | 55 | 9 | 11 | 1 | 0 | 33% | 36% |
| New Hampshire | 57 | 7 | 7 | 4 | 0 | 28% | 36% |
| New Jersey | 347 | 70 | 55 | 11 | 2 | 34% | 49% |
| New Mexico | 37 | 9 | 6 | 0 | 1 | 44% | 49% |
| New York | 884 | 100 | 102 | 28 | 11 | 31% | 46% |
| North Carolina | 349 | 39 | 43 | 13 | 7 | 41% | 49% |
| North Dakota | 22 | 2 | 5 | 1 | 0 | 50% | 59% |
| Ohio | 381 | 56 | 48 | 10 | 7 | 39% | 51% |
| Oklahoma | 82 | 13 | 19 | 1 | 0 | 46% | 40% |
| Oregon | 123 | 20 | 15 | 5 | 1 | 45% | 47% |
| Pennsylvania | 502 | 65 | 64 | 9 | 9 | 51% | 46% |
| Rhode Island | 56 | 9 | 8 | 1 | 1 | 33% | 48% |
| South Carolina | 135 | 20 | 19 | 5 | 2 | 45% | 46% |
| South Dakota | 39 | 6 | 2 | 2 | 1 | 33% | 70% |
| Tennessee | 177 | 21 | 27 | 8 | 1 | 43% | 46% |
| Texas | 752 | 75 | 104 | 23 | 12 | 44% | 43% |
| Utah | 115 | 16 | 17 | 3 | 1 | 6% | 23% |
| Vermont | 19 | 4 | 3 | 1 | 0 | 100% | 49% |
| Virginia | 288 | 44 | 39 | 13 | 2 | 57% | 52% |
| Washington | 232 | 31 | 34 | 5 | 3 | 26% | 52% |
| West Virginia | 39 | 7 | 10 | 0 | 0 | 43% | 37% |
| Wisconsin | 205 | 24 | 31 | 6 | 4 | 46% | 40% |
| Wyoming | 11 | 3 | 4 | 0 | 0 | 67% | 12% |

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their private practices to join larger groups and recently graduated dermatologists being more inclined toward working in large groups. The reasons behind this movement include less struggle to secure reimbursement, with the possibility of negotiating leverage with health plans; benefit from quality management; and better lifestyle and employee benefits.[22,23] This trend was found to be uniform across specialties.[24] However, dermatology practices seem to be particularly appealing to private equity firms. For instance, 15% of private equity medical practice acquisitions between 2014 and 2016 were dermatology practices.[25] A previous study found that solo practitioners tend to be older, while younger dermatologists are drawn into joining large groups. This may be in response to a number of factors, such as the growing complexity of contracting with insurance as well as increasing safety, privacy, and billing requirements, making the establishment of solo practices more burdensome.[6]

An analysis of the regional distribution of dermatology practices based on practice size revealed that the southern region had the lowest proportion of dermatologists in large groups and still had the highest increase in the number of large groups. An investigation of medical practice size trends in 2011 found that the concentration of physicians in large groups was particularly evident in the upper Midwest, the Northwest, and New England.[24] This helped elucidate a more recent establishment of large group practices in the South, making the expansion more evident compared with the slow but continuous growth in the Northeast, West, and Midwest, where these groups were established somewhat earlier.

The male-to-female ratio dwindled over time. The increase in female doctors' representation is not unique to the field of dermatology as the proportion of active female physicians increased from 29.7% in 2010 to 33.5% in 2016. This trend is likely to continue as women enrolling in medical schools have been outnumbering men since 2017.[26] Our results showed that female providers are more often represented in the field of dermatology (48% in 2017) than overall physicians (34% in 2016). This proportion is expected to further increase in the future as women now make up a larger percentage of dermatology residents.[27]

The number of female dermatologists increased in both solo and group practices. However, women seem to be more prone to working in a group setting than men as only 10% of women were solo practitioners versus 15% of men. In the field of otolaryngology as well, 50% of women practice in a group setting.[28] One motive behind this trend could be the setup of group practices, which allows for more flexible hours and work-life balance. This is further supported by the fact that female doctors are more likely to shift to part-time work in an attempt to minimize work-family conflict.[29] The growing proportion of female dermatologists might then partially explain the reason for young dermatologists' willingness to work in a group practice setting.[6] A group diversity analysis showed that all-male groups are more often represented than all-female groups. A previous report suggested that men tend to work more with all-male teams than women with all-female teams.[30] In our analysis, there was an increase in all-female practices and a decrease in all-male practices. This can be partially explained by the corresponding variation in the gender composition of the dermatology workforce but could also be related to men being more reticent about joining an all-female workplace[31] and to feminist movements encouraging women to work together.[32] It is worth noting that gender-mixed groups represent a majority among dermatology groups and continue to increase, with the gender gap decreasing over time. This might only have a positive impact on the quality of care. For instance, a study showed that female patients are more likely to survive a myocardial infarction if they are managed by a female physician. Moreover, patients treated by a male physician are more likely to survive if there are many female physicians in the department[33]; these findings reinforce the importance of gender diversity in the physician workforce.

An analysis of dermatology professionals' distribution based on the zip codes' poverty level found that they were more likely to be located in higher-income zip codes. Interestingly, this gap was more prominent in the Northeast and West, where the average poverty levels were the lowest, while the distribution was almost equal in the Midwest. Moreover, in the South, where the average poverty level was the highest, the trend was reversed, with dermatologists being more available in lower-income zip codes. These findings build on prior research about dermatology practice shortage across US counties. Vaidya et al[34] found a positive correlation between county median income and dermatologist density. Feng et al[14] revealed that despite a higher increase in dermatologist density in rural areas than in urban areas, the difference in density widened in favor of urban areas. Multiple considerations can influence a dermatologist's decision to settle in high-income areas. Dermatologists' interest in practicing procedural and cosmetic dermatology may drive them to wealthier communities, as in the field of plastic surgery.[35] Another contributing factor could be the lower and more delayed reimbursement in low-income areas.[36] A better lifestyle, greater

job opportunities for partners, and better schools for children are also elements that might play a role.

Prior studies did not consider these possible regional variations. The present study adds depth to our understanding of access to dermatologists by examining the income level-based distribution of dermatologists across different regions of the US. It is difficult to elucidate why these income level disparity trends are only seen in the Northeast and West. A hypothesis might be represented based on the fact that these regions have the highest income inequality. In fact, 7 out of the 10 states ranked higher based on income inequality are located in the Northeast and West.[37] This will widen the gap between lower-income and higher-income communities and consequently amplify disparity, including that in health care availability. Further studies are warranted to investigate these findings.

## CONCLUSIONS

Our study has some limitations. First, the Medicare provider utilization and payment data may not have been exhaustively representative of the dermatology workforce as it only included information on Medicare beneficiaries. Second, each dermatologist listed in the Medicare data was associated with a single billing address. Thus, dermatologists with multiple practice sites were not accounted for, which might have limited the accuracy of our analysis. Third, the analysis of the dermatologists' distribution based on the zip codes' income level excluded 489 dermatologists because their billing addresses' zip codes were missing from the Internal Revenue Service tax dataset. Fourth, other data that could be interesting to analyze, such as physicians' age and practice ownership status, were not provided in the Medicare dataset. Further studies are warranted to elucidate these points.

### Conflicts of interest

None disclosed.

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