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Geospatial analysis of access to dermatology care in Los Angeles County: a cross sectional study

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Abstract

Geographic maldistribution of dermatologists contributes to disparities in access to dermatologic care. We aimed to investigate the geographic distribution of, and differences in wait times for medical dermatology services in Los Angeles County. We placed phone calls to 251 dermatology practices in LAC to ask for a new patient appointment for a changing mole. We found West Los Angeles County (Service Planning Area [SPA] 5) had the highest number of dermatologists and South LAC (SPA 6) had the lowest (26.1 versus 0 per 100,000 residents, P=0.01). Service Planning Area 6 has a higher non-White, uninsured, and impoverished population than SPA 5. Dermatology appointment wait times and Medicaid acceptance varied between SPAs but was not statistically significant (P=0.37 and P=0.20, respectively). Medicaid-accepting practices had a significantly longer mean wait time for an appointment than practices that did not accept Medicaid (26.1 versus 15.1 days, P=0.003). Regions with predominantly non-White, Spanish-speaking, and medically underinsured residents were found to be disproportionately lacking in dermatologists across LAC, which may contribute to impaired access to dermatology services in Los Angeles County.

Keywords: care access, dermatologist distribution, healthcare disparities

Introduction

In the United States (U.S.), geographic maldistribution of dermatologists contributes to disparities in access to dermatologic care [1,2]. However, it is unknown if similar geographic maldistribution of dermatologists exists at the micro or local level. Anchored by a diverse urban metropolitan area, Los Angeles County (LAC) in California is the most populous county in the U.S. [3]. In this cross-sectional study, we aimed to investigate the geospatial aspects of access to dermatologic care in LAC by assessing the geographic distribution of dermatologists in LAC and its correlation with access to dermatologic care, with particular attention to the medically underserved population of LAC.

Methods

In May 2018, a directory of 554 dermatologists in LAC was acquired from infoUSA®, (Data Axle, Dallas, TX), a commercially available database providing lists of business and professional offices, including physician offices, that has previously been used to investigate availability of health services in U.S. communities [4,5]. Duplicates (same dermatologist or same office location), retired physicians, closed-panel health maintenance organizations (HMOs), Veterans Affairs affiliates, and practices verified to be outside LAC were excluded, resulting in 395 eligible office locations. From June 2018 to March 2019,

investigators (SAM and JRS) placed scripted phone calls to eligible practices assuming the role of a new patient seeking an appointment for a changing mole [6]. During the phone call, information on the practice's number of dermatologists and advanced practice providers (APPs, specifically nurse practitioners and physician assistants), new appointment wait time, Spanish-language assistance (either a Spanish-speaking provider or staff or the availability of interpreter services), and Medicaid acceptance were collected. An additional 144 practices were excluded after obtaining additional information on the phone call. Excluded practices did not have a board-certified dermatologist on staff (for example, dermatology services being offered by a family practice doctor or anesthesiologist), (N=34), were majority subspecialty (primarily practicing cosmetic dermatology, Mohs surgery, or dermatopathology [N=24]), closed to new patients at the time of the inquiry (N=5), private HMOs (N=3), unreachable after three attempts (N=20), or duplicates (N=58). Practice addresses were mapped to their corresponding LAC Department of Public Health's (DPH) SPA, a geographic region within LAC designated by LAC DPH for healthcare planning purposes. Population characteristics of each LAC SPA were obtained from LAC DPH [7]. The density of dermatologists in each SPA was calculated. Descriptive and bivariate statistics were calculated and P values <0.05 were considered statistically significant. The study was deemed exempt by the University of California, Los Angeles, Institutional Review Board.

Results

The overall number of dermatologists per 100,000 residents in LAC across the 251 surveyed offices was 4.73, although dermatologist density differed significantly by geographic region. Service Planning Area 5 (West) had the greatest density of dermatologists (26.1 per 100,000 residents), which was more than four times greater than the next highest density region, SPA 2 (San Fernando) at 5.7. Service Planning Area 6 (South) had no dermatologists (P=0.01; **Figure 1** and **Table 1**).

The overall mean wait time to see a dermatologist or APP was 16.79 and 10.61 days, respectively. The longest mean wait time to see a dermatologist was in SPA 1 (Antelope Valley) at 34.3 days and the shortest mean wait time was in SPA 2 (San Fernando) at 13.64 days. There was no statistically significant difference between SPAs with respect to mean wait time to see a dermatologist (P=0.37). The longest mean wait time to see an APP was in SPA 1 (Antelope Valley) at 27.0 days and the shortest was in SPA 3 (San Gabriel) at 4.6 days; the differences between SPAs in mean wait times to see an APP were statistically significant (P=0.002).

Over 40% of LAC dermatology offices did not offer Spanish language assistance and Medicaid was accepted by fewer than one-fifth (17.5%) of the offices surveyed. The mean wait time for a new patient appointment at offices that accepted Medicaid was 26.1 days (SD 21.5) versus 15.0 days

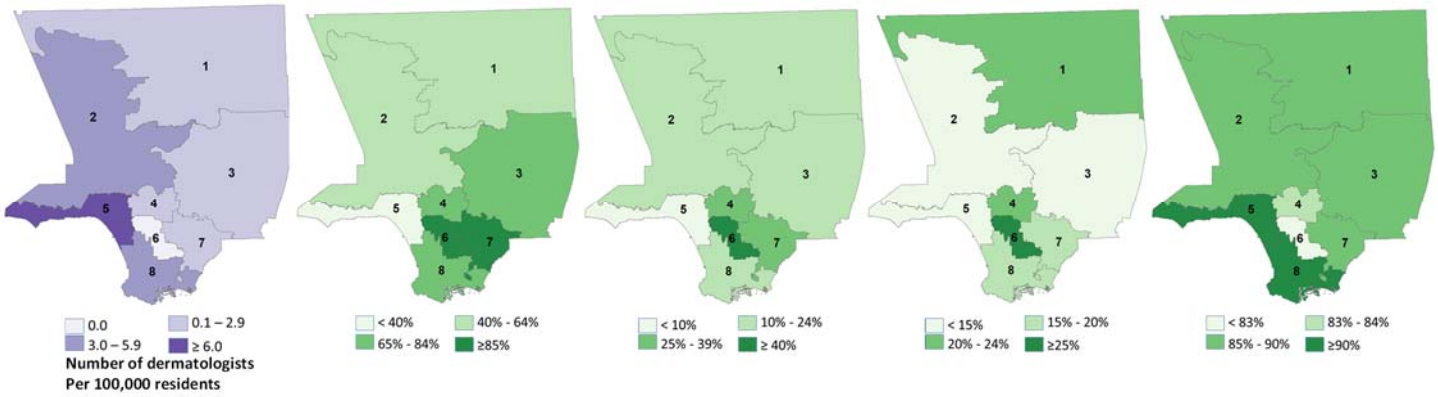

Figure 1. *Los Angeles County dermatologist density and population characteristics by service planning area (SPA). Numbers on maps represent corresponding SPAs.* ***A)*** *Dermatologist density per 100,000 residents.* ***B)*** *Percent non-White race or ethnicity.* ***C)*** *Percent of households with Spanish as the primary language spoken at home.* ***D)*** *Percent of households with incomes less than 100% of the Federal Poverty Level.* ***E)*** *Percent of population with medical insurance [7].*

Table 1. *Dermatology offices characteristics by service planning area (SPA).*

	Los Angeles County Total	SPA 1 Antelope Valley	SPA 2 San Fernando	SPA 3 San Gabriel	SPA 4 Metro	SPA 5 West	SPA 6 South	SPA 7 East	SPA 8 South Bay	P value
Number of surveyed practices included in analysis	251	4	56	35	17	88	0	10	41	-
Number of dermatologists per 100,000 residents	4.73	1.53	5.70	2.81	2.10	26.1	0	1.37	5.35	0.01
Number of APP per 100,000 residents	1.15	0.51	1.56	1.01	0.09	3.87	0	0.31	1.48	0.30
Wait time to see a dermatologist, mean days (SD)	16.79 (17.44)	34.3 (29.1)	13.64 (11.1)	14.84 (14.9)	20.12 (20.9)	17.9 (20.4)	-	18.0 (12.6)	18.26 (18.1)	0.37
Wait time to see an APP, mean days (SD)	10.61 (9.75)	27.0 (17.4)	11.34 (9.0)	4.60 (2.7)	21.5 (19.1)	8.33 (6.3)	-	18.25 (13.4)	7.22 (5.8)	0.002
Practices accepting Medicaid, N (%) *	41 (17.5)	1 (25.0)	12 (21.8)	3 (9.4)	3 (17.7)	17 (21.8)	-	3 (30.0)	2 (5.1)	0.20
Practices with Spanish-language assistance , N (%) *	127 (58.0)	3 (75.0)	32 (66.1)	16 (54.3)	10 (68.8)	48 (60.9)	-	4 (40.0)	25 (71.1)	0.56

APP=advance practice provider, SPA=service planning area.
**Complete information for N=235 practices for Medicaid acceptance and N=219 for Spanish-language assistance. 16 practices were unable to provide information about Medicaid acceptance, and 32 practices were unable to provide information about Spanish-language assistance.*

(SD 15.7) for offices that did not accept Medicaid (P=0.003).

Analysis of dermatologist distribution data with corresponding LAC DPH demographic data for each SPA found SPAs 6 (South) and 7 (East) to have the county's highest non-White populations but also the county's fewest number of dermatologists per capita (**Figure 1**, **Table 1**). In contrast, SPA 5 (West) has the county's lowest non-White population, the fewest residents living in poverty, and the highest number of dermatologists.

Discussion

This study highlights a maldistribution of dermatologists across LAC. The area of LAC with the most dermatologists per capita (SPA 5 [West]) has the county's lowest non-White population and fewest residents living in poverty. In contrast, the portions of LAC with the fewest dermatologists per capita have the highest percentage of non-White residents, the highest percentage of uninsured residents, the highest percentage of residents living under the federal poverty line, and the highest percentage of residents who speak Spanish as their primary language. The lack of dermatologists in these areas creates "dermatology deserts" in portions of LAC analogous to "pharmacy deserts" in low income and Black or Hispanic/Latino neighborhoods in large urban communities across the United States [8].

We identified only 6 dermatology offices from the original InfoUSA list in SPA 6 (South), but all were excluded from data analysis due to sub-specialization (N=3), having no board-certified dermatologist on staff (N=2), or being unreachable after three attempts (N=1). Service Planning Area 6 (South) historically fares worse than all other SPAs on

multiple indicators of health [9]. For example, in 2005, the rates of childhood asthma (8.6%), obesity (28.9%), and diabetes (11.1%) in South LA far outpaced that seen in West LA (4.9%, 14.1%, 4.5% respectively), [9]. Furthermore, mortality as measured by age-adjusted deaths per 100,000 population from diabetes (42.7), liver disease (13.9), cardiovascular disease (214.4), and cancer (185.7) was worse in South LA as compared to West LA (14.0, 5.8, 127.7, and 151.9 respectively), [9]. The physician supply is 0.12 per 1,000 population in South LA compared to 1.27 per 1,000 population in West LA [9]. Considering the existing poorer health status of residents in SPA 6 (South), our findings underscore the need for physicians to serve these communities.

Encouraging medical school and residency programs to have specialized tracks that emphasize care for underserved communities may help recruit and optimally prepare trainees who are interested in serving these communities [10]. Additionally, recruitment of minority groups underrepresented in medicine, applicants showing a strong interest in serving underserved areas, and applicants of diverse geographic and socioeconomic backgrounds into medical school and dermatology residency programs may lead to a higher likelihood of dermatologists serving these communities [11]. After orthopedic surgery, dermatology is the second-least diverse medical specialty in the U.S. [12,13]. Physicians from minority groups underrepresented in medicine have been shown to be more likely to care for non-White, poor, Medicaid, or uninsured patients [14,15]. Incentivizing dermatologists to work in underserved areas may also help correct this inequitable distribution of dermatologists. Physician loan repayment programs have successfully drawn physicians to work in underserved areas [16,17] and in one survey, 39% of dermatology residents expressed a willingness to move to a rural or urban underserved area in exchange for physician loan assistance [18].

Despite this unequal distribution of dermatologists between SPAs in LAC, we did not find a statistically significant difference in wait times to see a dermatologist between different SPAs. This could be explained by residents of SPAs with fewer dermatologists travelling to different SPAs to seek out dermatologic care, or overall decreased demand for dermatologic services by residents in a given SPA. Although the geographic distance between SPAs may not be great, transportation difficulties and the unequal burden of travel placed on residents of SPAs with few to no dermatologists, which have a disproportionate share of poor and underinsured/uninsured populations, can present a large barrier to healthcare access [19,20]. Telemedicine has shown promise in overcoming this travel barrier [21], especially during the COVID-19 pandemic, but there has been lower adoption of telemedicine by non-White and lower income patients [22,23]. Furthermore, by preferentially improving healthcare access for patients who already fare well in this regard, telemedicine may in some ways even worsen existing disparities [22,23].

At 17.5%, Medicaid acceptance was low in the dermatology practices surveyed and similar to or lower than reported in previous national surveys of dermatologists. A survey of U.S. dermatologists in 2002 found 32% of surveyed dermatologists accepted Medicaid and a more recent 2019 survey found just 17% of surveyed dermatologists accepted Medicaid [24,25]. Although increasing Medicaid acceptance by dermatologists may increase dermatology access, doing so would not likely be enough to completely repair inequities in dermatology access, as studies have shown that dermatology patients with Medicaid still face longer wait times than non-Medicaid dermatology patients [24-26]. Findings in our study corroborate this, as offices that accepted Medicaid had a significantly longer wait time for a new dermatology patient appointment than offices that did not accept Medicaid. It is possible that increasing Medicaid reimbursement may improve provider Medicaid acceptance and improve Medicaid patient wait times but data to date is conflicting [24,27-29].

There are several limitations of this study that should be considered. Firstly, this study was cross-sectional in nature and the number and location of dermatologists and APPs, as well as features such as wait times, Medicaid acceptance, and the availability of Spanish language assistance may be subject to

change over time. Future studies can confirm our findings and monitor changes to our findings over time. Secondly, many offices were excluded in our study, which may have led to underestimation of the number of dermatology providers. Non-dermatologist physicians, non-board-certified dermatologists, and subspecialty dermatology practices (i.e., primarily cosmetic, Mohs surgery, or dermatopathology practices) may still provide the medical dermatology service (evaluation of a changing mole) queried in our study. However, the inclusion of these providers still does not mitigate the geographic disparity in board-certified dermatologists found in our study. Even if all 6 excluded practices from SPA 6 (South) were included in our analysis, the per capita number of dermatologists would only be 0.58 per 100,000 residents, far fewer than other SPAs (**Table 1**). Additionally, data collection took place over a 10-month period which could potentially lead to variations in provider wait times due to temporal and seasonal fluctuations. Finally, our database may have been incomplete. However, InfoUSA is a reliable commercial database that has been used in published literature in other fields [5]. Further studies can include other databases to increase the robustness of this work.

Conclusion

We demonstrate a geographic maldistribution of dermatologists in LAC. Regions with predominantly non-White, Spanish-speaking, and medically-underinsured residents were found to be disproportionately lacking in dermatologists, essentially dermatology deserts. However, an adjacent region with a predominantly White, relatively affluent, and medically well-insured population demonstrated an abundance of dermatologists. Further work is needed to understand the factors contributing to these differences and to understand if other large urban counties share similar maldistribution of dermatologists. Investigation of how these dermatology deserts affect the health outcomes of their residents and interventions to address these disparities are needed.

Potential conflicts of interest

JLH is on the Board of Directors for the Hidradenitis Suppurativa Foundation, and is a speaker for AbbVie, and consultant for Novartis. This research was supported by NIH National Center for Advancing Translational Science (NCATS) UCLA CTSI Grant Number UL1TR001881 (SH, SDV, AFB). The remaining authors report no conflicts of interest.

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