

Geographic Maldistribution and Travel Burden in Access to Dermatologic Care in Virginia: A Statewide Geospatial Analysis

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Background & Objective

- National studies show persistent metropolitan concentration of the dermatology workforce and widening urban–rural gaps in dermatologist density.^{1–3}
- Statewide dermatologist counts may obscure whether patients have geographically accessible *local* care.^{2,4}
- Virginia pairs dense metropolitan centers with extensive rural and Appalachian regions that face persistent health-access disparities.⁵

Objective: Characterize county-level dermatologist availability, geographic travel burden, and concentration of dermatology capacity across Virginia.

Methods

Design: Cross-sectional statewide geospatial analysis of all 133 Virginia counties and independent cities.

Dermatologist identification: NPPES/NPI registry⁶; active NPI-1 physician dermatologists identified by prespecified clinical dermatology taxonomy codes. *Excluded:* residents, advanced practice/nonphysician clinicians, dermatopathology-only physicians.

Denominators: *Workforce:* 514 dermatologists assigned to a county-equivalent by NPPES practice address (460 geocoded to a practice site; 54 assigned by address county). *Geospatial:* 460 geocoded dermatologists at 233 unique practice sites.

Population & geography: ACS 2019–2023 5-year estimates; 2023 Census TIGER/Line⁷; 2023 USDA Rural-Urban Continuum Codes (RUCC).⁸

Travel metric: Straight-line distance from each census-tract centroid to the nearest geocoded practice site, aggregated to counties by tract population weights.

Rurality: Metropolitan = RUCC 1–3; nonmetropolitan urban = RUCC 4–6; nonmetropolitan rural = RUCC 7–9.

Analysis: Density = dermatologists per 100,000 ACS residents; RUCC-group comparisons are descriptive (no hypothesis testing).

Limitations

- NPI practice addresses indicate physician presence, not appointment availability, wait times, insurance acceptance, or clinical full-time effort.
- Distances are straight-line tract-centroid-to-site geographic access estimates, not patient-specific road travel time.
- Site/distance analyses used the 460 geocoded physicians; all 514 were retained for county-level workforce analyses, and assigning the 54 non-geocoded physicians by practice-address county changed the zero-dermatologist status of only 1 county.

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How far is the nearest dermatologist?

County population-weighted mean straight-line distance from census-tract centroids to the nearest practice site

KEY FINDINGS

78 of 133

county-equivalents had no dermatologist
58.6%

1.61 million

residents in a county with no dermatologist
18.6% of Virginians

13.9 mi

mean county distance to the nearest site
averaged over 133 county-equivalents

25.1 vs 7.3 mi

nonmetropolitan rural vs metropolitan counties
≈3.4-fold difference

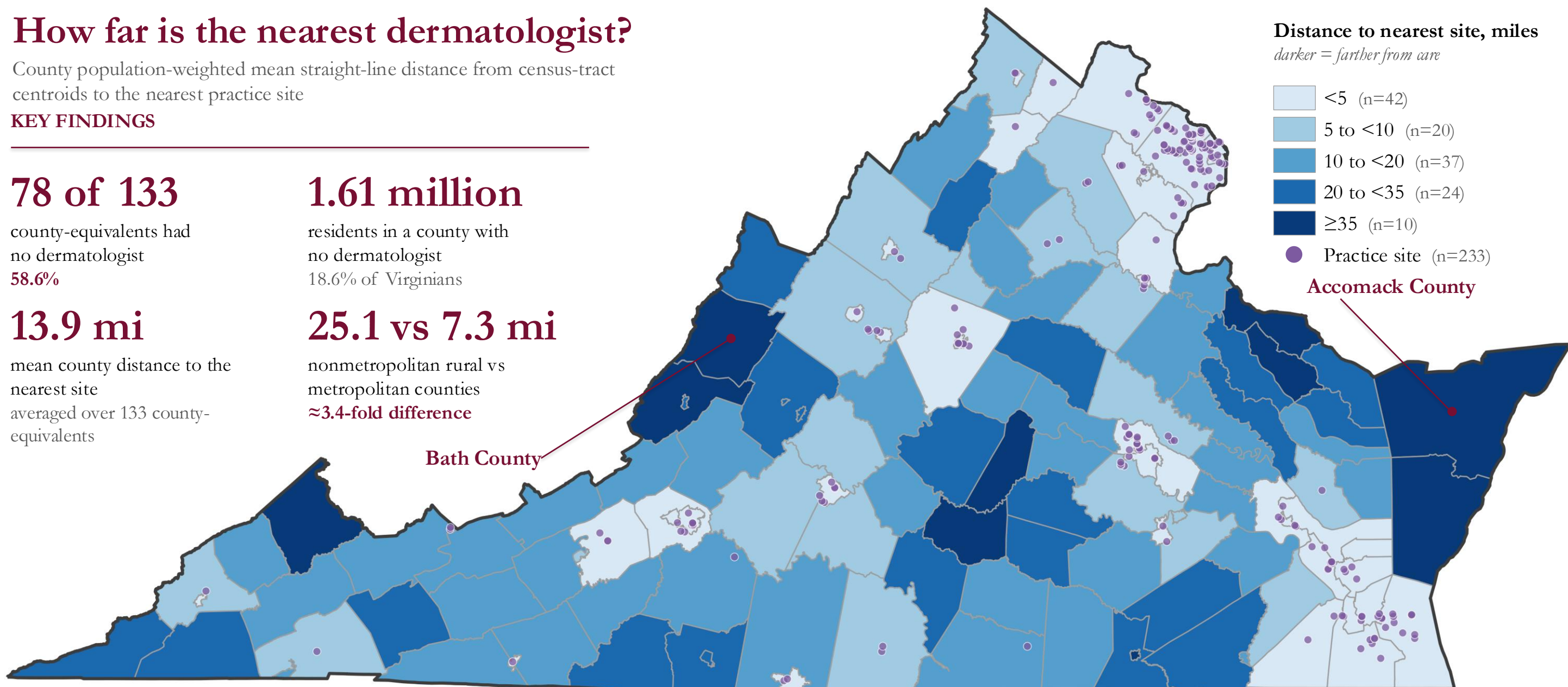
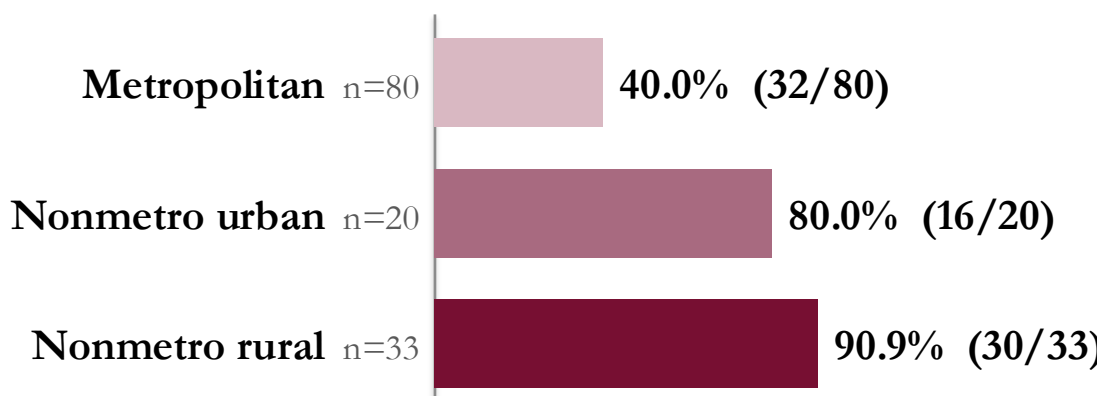


Figure 1. County-level geographic access to dermatology care across Virginia; dots indicate the 233 geocoded dermatology practice sites.

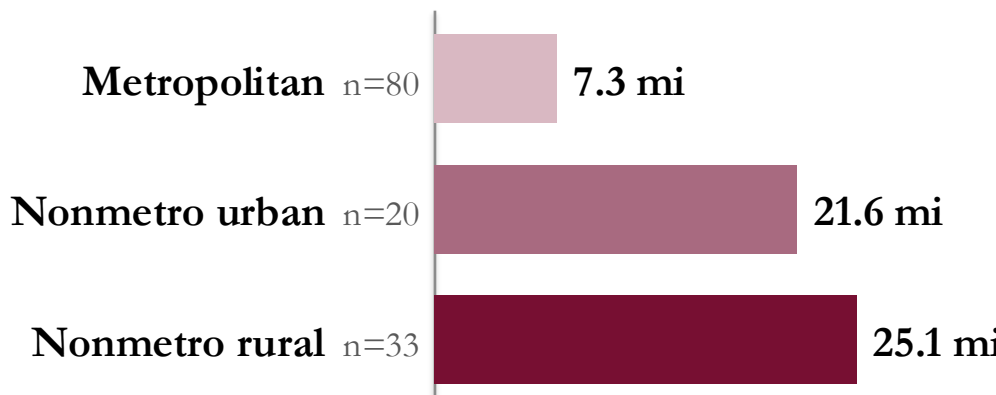
Results

Among 514 included dermatologists, 460 (89.5%) were geocoded to 233 unique practice sites. Geographic access worsened markedly with rurality on every measure (Figure 2), and dermatology capacity was concentrated within a small number of practice hubs (Figure 3).

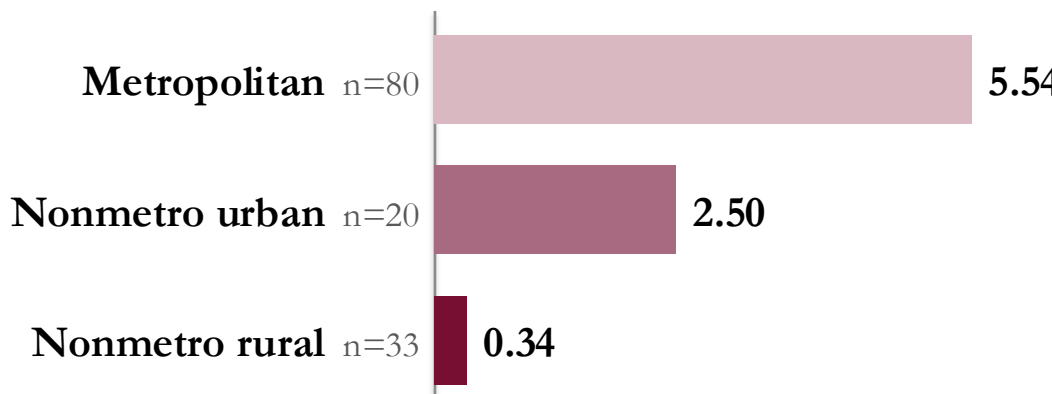
A. Counties with no dermatologist



B. Mean straight-line distance to nearest site



C. Mean county density, per 100,000



Statewide pooled density 5.94; median county density 0

Figure 2. Rurality gradient in county-level dermatology access by 2023 USDA RUCC group: (A) zero-dermatologist counties, (B) population-weighted distance, (C) dermatologist density. Descriptive; no hypothesis testing.

Dermatologists per site, 11 largest sites

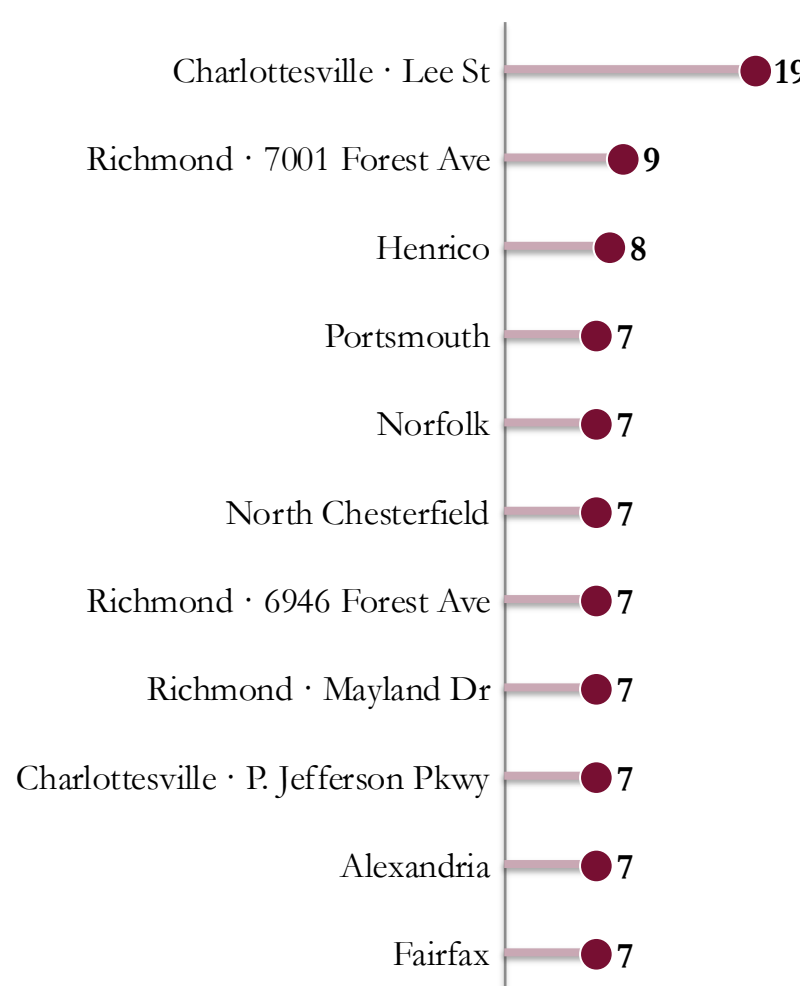


Figure 3. The 11 practice sites with ≥7 dermatologists (of 233). **Hub concentration:** the 10 largest sites held 85 of 460 geocoded dermatologists (18.5%); the largest single site had 19.

Where was travel burden greatest?

Accomack County

57.8 mi population-weighted mean distance
84.1 mi maximum tract distance
0 dermatologists
Bath 42.9 · Richmond County 38.4
Prince Edward 38.3 · Cumberland 37.8 mi

Discussion

What this adds: Virginia’s statewide (pooled) density of 5.94 dermatologists per 100,000 masks profound local maldistribution: the median county density was 0. This brings national evidence of metropolitan clustering^{1–3} to the within-state scale, and concentration of capacity in a few large sites mirrors the national shift toward larger group practices.⁹

Why it matters: Greater travel distance is an established barrier to timely specialty evaluation and is associated with more advanced melanoma at diagnosis.¹⁰ Absent local care may delay evaluation, surveillance, biopsy, and procedure-capable care, especially in rural communities.⁴

Implications: Workforce planning should weigh where dermatologists practice and how far communities are from care, not statewide counts alone. Candidate responses: rural referral networks and targeted outreach,⁴ teledermatology as an adjunct to in-person care,¹¹ mobile services where feasible, and policies supporting geographically underserved communities.

Conclusion

Virginia’s aggregate dermatology workforce masks substantial geographic inequity. More than half of county-equivalents had no dermatologist, and mean distance to care was more than 3-fold higher in nonmetropolitan rural than metropolitan counties. Workforce planning should account not only for how many dermatologists practice statewide, but where care is geographically available.