

# The Impact of Geographic Dermatologist Density on Melanoma Mortality

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## INTRODUCTION

Melanoma is one of the most common malignancies in the United States (US) and has the highest mortality rate of any skin cancer.<sup>1</sup> A study exploring the effects of dermatologist density on melanoma mortality rate (MMR) between 1988 and 1993 found that higher dermatologist geographic density was associated with improved prognosis.<sup>2</sup>

An analysis of MMR between 2002 to 2006 suggested that the presence of up to 2 dermatologists/100,000 people significantly lowered MMR by 53% when compared to no dermatologists.<sup>3</sup> The overall density of US dermatologists has increased over the past several decades, yet the present density (3.66/100,000) remains below the recommended for adequate care (>4/100,000).<sup>4</sup> In this study, we utilize current data to explore the relationship between MMR and dermatologist density.

## MATERIALS AND METHODS

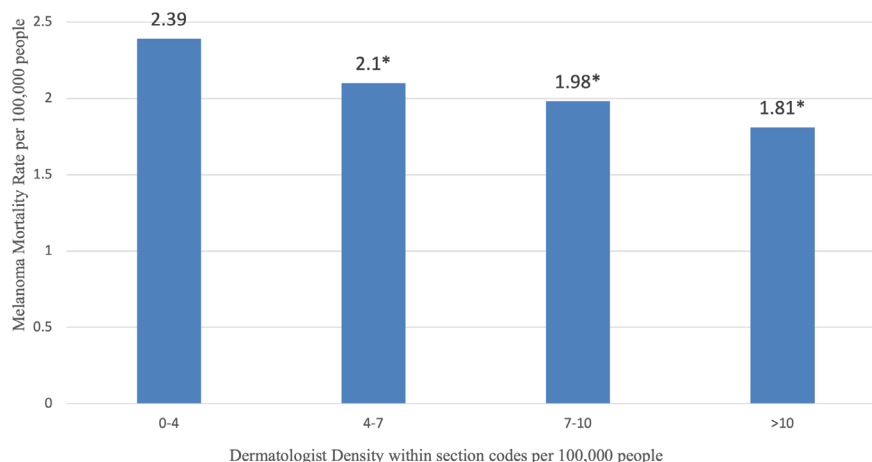
A cross-sectional analysis including 659 section codes with a total population of 306,658,964 was performed. Dermatologist density was calculated using 2023 AAD membership data

per US postal section codes (first 3 digits of zip codes) and population and median income data for section codes from the 2020 US Census Bureau.<sup>4</sup> MMR for US counties was obtained from the NCI for 1/2016-12/2020.<sup>5</sup> All ages, sexes, and races were included. Per NCI guidelines, counties were excluded if they had insufficient data for calculation of MMR.<sup>5</sup> Counties were matched to section codes using HUD Crosswalk Files. Urban areas were defined as >250,000 population based on SEER Rural-Urban Continuum coding. Multivariable linear regression was used to assess significance of relationships.

## RESULTS

Overall age-adjusted MMR was 2.1/100,000 with a significant inverse correlation to dermatologist density ( $r=-0.263$ ,  $P<0.001$ ). MMR directly improved with increasing dermatologist density (0-4/100,000 MMR=2.39, 4-7/100,000 MMR=2.10, 7-10/100,000 MMR=1.98, >10/100,000 MMR=1.81; Figure 1). Section codes with dermatologist density less than the recommended value for adequate coverage of 4/100,000 had significantly higher MMR compared to those with a density of >4/100,000 (2.39 vs 2.01,  $P<0.001$ ).

**FIGURE 1.** Relationship of Dermatologist Density to Melanoma Mortality Rate.



\*Significantly different compared to 0-4/100,000 with  $P<0.001$ .

Population and median income also correlated with MMR. Section codes with a population <250,000 had a significantly higher MMR compared to those with a population >250,000 (2.46 vs 2.17,  $P<0.001$ ). Median income inversely correlated with MMR ( $r=-0.32$ ,  $P<0.001$ ). However, using multivariate linear regression to adjust for these two variables, dermatologist density continued to have a statistically significant independent inverse impact on MMR.

### DISCUSSION

A prior study suggested dermatologist density above 2/100,000 did not further reduce MMR.<sup>3</sup> However, our findings demonstrate that MMR continues to decrease when increasing dermatologist density beyond that value.

Metropolitan counties have been associated with approximately 30% reduction in MMR.<sup>3</sup> Our results support this, as lower MMR correlates with greater population size. This may be due to dermatologist density being greater in urban section codes,<sup>4</sup> leading to better access for patients at risk for developing melanoma. However, even after accounting for population, dermatologist density independently was related to improved MMR.

Limitations include inability to include non-AAD dermatology clinicians or counties without mortality data. Patients may receive treatment and dermatologists may practice across section codes. However, utilizing the same methodology as prior published studies further supports these results.

### CONCLUSION

Greater dermatologist density is independently significantly related to lower MMR. This finding may be due to earlier detection of melanoma and the opportunity to have suspicious lesions evaluated through potential enhanced access.

### DISCLOSURES

The authors have no conflicts of interest to disclose.

### ACKNOWLEDGMENT

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