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Distance to Diagnosing Provider as a Measure of Access for Patients With Melanoma

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Abstract

Objective—To examine the effect of travel distance and other sociodemographic factors on access to a diagnosing provider for patients with melanoma.

Design—Analysis was performed of all incident cases of melanoma in 2000 from 42 North Carolina counties.

Setting—Academic research.

Participants—Patients and providers from 42 North Carolina counties were geocoded to street address.

Main Outcome Measures—Associations between Breslow thickness and clinical and sociodemographic factors (age, sex, poverty rate, rurality, provider supply, and distance to diagnosing provider) were examined.

Results—Of 643 eligible cases, 4.4% were excluded because of missing data. The median Breslow thickness was 0.6 mm (range, 0.1–20.0 mm). The median distance to diagnosing provider was 8 miles (range, 0–386 miles). For each 1-mile increase in distance, Breslow thickness increased by 0.6% ($P=.003$). For each 1% increase in poverty rate, Breslow thickness increased by 1% ($P=.04$). Breslow thickness was 19% greater for patients aged 51 to 80 years than for those aged 0 to 50 years ($P=.02$) and was 109% greater for patients older than 80 years than for those aged 0 to 50 years ($P<.001$). Sex, rurality, and supply of dermatologists were not associated with Breslow thickness.

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Conclusions—For patients with melanoma, distance to the diagnosing provider is a meaningful measure of access that captures different information than community-level measures of rurality, provider supply, and socioeconomic status. Future work should be targeted at identifying factors that may affect distance to diagnosing provider and serve as barriers to melanoma care.

Survival for patients with melanoma is dependent on stage at diagnosis.^{1,2} As Breslow thickness increases, overall survival decreases; 5-year overall survival is greater than 85% for patients with Breslow thickness of less than 1.0 mm compared with less than 50% for patients with Breslow thickness of greater than 4.0 mm.³ Consequently, early diagnosis may substantially improve patient outcomes. Because melanoma can only be definitively diagnosed based on biopsy findings, diagnosis requires detection of the suspicious lesion and biopsy.⁴⁻⁷ Some primary care providers perform diagnostic biopsies, but many prefer to refer patients to dermatologists or surgeons. As a result, early diagnosis often is dependent on access to specialists who are comfortable diagnosing melanoma.

Access to health care is affected by sociodemographic factors such as income, education, rurality, travel distance, and provider supply.⁸ By affecting access, these factors influence patient care and outcomes. For cancer, sociodemographic factors have been associated with incidence, stage at diagnosis, treatment, trial involvement, and prognosis.⁹⁻¹⁷ For melanoma specifically, little is known about the relationships between sociodemographic factors and patient outcomes. Findings from some studies^{1,18-22} suggest that education, socioeconomic status, and physician supply may affect stage at diagnosis and survival, but the influence of travel distance on access to care and outcomes for melanoma has not been considered, to our knowledge. Our study seeks to fill this knowledge gap by exploring the effect of distance to diagnosing provider on access to care for melanoma.

Although increased travel distance is generally viewed as a barrier to screening, early diagnosis, and treatment, previous studies^{15,17,23-25} examining the role of travel distance for patients with cancer have had mixed results. We hypothesize that for patients with melanoma greater distance to a diagnosing provider is associated with increased Breslow thickness or stage at diagnosis.

METHODS

Genes, Environment, and Melanoma is an international study that used a multisite population-based ascertainment to examine causative factors associated with melanoma.^{26,27} The North Carolina (NC) ascertainment included all incident cases of invasive cutaneous melanoma in 2000 from a 42-county area. Eligible cases were identified for the Genes, Environment, and Melanoma study through collaboration with the NC Central Cancer Registry. This registry collects data on all incident cases of invasive melanoma among NC residents through mandatory reporting. State law allows use of deidentified data for approved research. Hospitals are the primary sources of data, but these data are supplemented with data from private physicians, pathology laboratories, and death certificates. The registry obtains additional clinical information through direct review of original medical records. For the Genes, Environment, and Melanoma study, all dermatologists in the 42 counties were notified of the study, were encouraged to report cases of melanoma to the registry, and were asked where their histopathology specimens were processed. With separate institutional review board approval, the NC study population was used for our study.

Diagnosis of melanoma often involves multiple providers; however, because definitive diagnosis is made by histopathologic examination, the diagnosing provider was defined for this study as the physician or physician extender who performed the initial biopsy, as

identified from the pathology report. Patients and providers were geocoded to street address using ArcView 9.0 and the StreetMap04 address locator (ESRI, Redlands, California). Euclidian (straight line) distance was calculated between patient home and physician office.²⁸

Using a series of single-variable linear regressions of the natural log of Breslow thickness on clinical and sociodemographic characteristics, bivariate associations were examined. Because Breslow thickness was skewed, it was log transformed for analysis. Regression coefficients for continuous measures are interpreted as the percentage change in tumor thickness associated with a 1-U change in the measure. For characteristics captured as dichotomous variables, the percentage change in tumor thickness compared with the referent category is calculated by subtracting 1 from the exponent of the β coefficient ($e^{\beta}-1$).

The relationship between distance and the natural log of Breslow thickness was linear except as distance reached extreme values. Consequently, distance was examined as a continuous variable. A dummy variable created for the extreme values (99th percentile, >193 km [>120 miles]) was interacted on the continuous distance variable. Distance was also separately examined as a dichotomous variable, using a conventional cut point (24 km [15 miles]).¹⁵

Census tract poverty rates represent the percentage of residents in the census tract living at or below the 100% poverty line based on 2000 census information.²⁹ Rurality was examined using the Office of Management and Budget metropolitan classification system and the US Department of Agriculture rural urban classification codes. Supply of dermatologists in a county was examined 3 ways, namely, present or absent, absolute number, and density per 100 000 residents.

Two multiple log-linear regression models were investigated, one that included all covariates and one that excluded characteristics that were statistically nonsignificant in the bivariate analyses. The latter model was investigated because of the possibility that statistically nonsignificant results were due to large SEs attributable to the somewhat large number of variables relative to the number of observations. Statistical analyses were performed using STATA 8 (StataCorp LP, College Station, Texas). All probability values reflect the results of 2-sided tests and were considered statistically significant at P .05.

The same data set was used to identify factors that may affect distance to diagnosing provider. Robust regression analysis was used to minimize error due to extreme values. Additional factors examined included provider specialty and several measures of provider supply. This information was obtained from the NC Health Professions Data System, which tracks licensure data for all NC health care professionals.

RESULTS

There were 643 patients with at least 1 incident invasive cutaneous melanoma in the 42-county NC ascertainment area in 2000. Twenty-eight cases (4.4%) were excluded because of missing Breslow thickness or street address information; this included patients diagnosed as having metastatic melanoma for whom no primary tumor was identified. Clinical and sociodemographic characteristics of the remaining 615 patients are given in Table 1.

Two hundred seventy-seven distinct diagnosing providers were identified. Only 15 providers diagnosed the melanomas in at least 1% (range, 0.2%–2.9%) of patients. All cases were diagnosed by providers in NC. Ninety-nine percent of patients traveled less than 120 miles to reach their diagnosing providers; the remaining 1% traveled between 233 and 386 miles. Patients were mapped to street address, and distance to diagnosing provider was visually examined (Figure 1). Although most patients who traveled long distances were from the

same region, their melanomas were diagnosed by different providers at different institutions, and no pattern could be identified. Within a given region, there was substantial variability in distance, with some patients traveling short distances to reach their diagnosing providers and other patients traveling much longer distances.

In the bivariate analysis, Breslow thickness was statistically significantly associated with distance to diagnosing provider (Table 2). For distances not exceeding 120 miles, each 1-mile increase in distance corresponded with a 0.6% increase in the mean Breslow thickness ($P=.003$). In other words, each 10-mile increase in distance corresponded with a 6% increase in Breslow thickness (Figure 2). After dichotomizing distance at 15 miles (75th percentile), patients who traveled more than 15 miles had 20% thicker tumors on average than patients who traveled 0 to 15 miles ($P=.02$).

Consistent with historical evidence,^{1,30–32} Breslow thickness was associated with age at diagnosis (Table 2). The relationship between age at diagnosis and Breslow thickness was nonlinear, so age was categorized as 0 to 50 years (245 cases), 51 to 80 years (329 cases), or older than 80 years (41 cases). In the bivariate analysis, patients aged 51 to 80 years averaged 19% thicker tumors than patients aged 0 to 50 years ($P=.02$), and patients older than 80 years averaged 109% thicker tumors than patients aged 0 to 50 years ($P<.001$). Sex and primary tumor site were unassociated with Breslow thickness ($P>.05$).

Poverty rate was statistically significantly associated with Breslow thickness in the bivariate analysis; for every 1% increase in census tract poverty rate, Breslow thickness also increased by 1% ($P=.04$). No association between Breslow thickness and rurality could be identified using the Office of Management and Budget or US Department of Agriculture classifications ($P>.05$). However, when patients were stratified as rural vs metropolitan, the effect of distance to diagnosing provider on Breslow thickness seemed greater for cases from rural areas compared with cases from metropolitan areas. Every 10-mile increase in distance corresponded with a 10% increase in Breslow thickness ($P=.06$) for cases from rural counties compared with a 5% increase in Breslow thickness ($P=.03$) for cases from metropolitan counties.

The median Breslow thickness for cases diagnosed by dermatologists (0.5mm) was statistically significantly less than the median Breslow thickness for cases diagnosed by surgeons (1.04 mm) or by other providers (0.62 mm) ($P<.001$). When the supply of dermatologists was examined using the density of dermatologists per 100 000 residents in the county, there was no association between Breslow thickness and dermatologist supply ($P>.05$). Similarly, there was no association between the dichotomous dermatologist present or absent variable and Breslow thickness ($P>.05$). However, using the absolute number of dermatologists, Breslow thickness decreased by 0.9% for every additional dermatologist in the county ($P=.004$).

There was no statistically significant correlation between any of the sociodemographic factors (distance, poverty, rurality, and dermatologist supply), so all were included in the multivariate analysis. Because provider specialty cannot directly affect Breslow thickness, provider specialty was not included in the multivariate model. After adjusting for other factors, only age and distance to diagnosing provider were statistically significantly associated with Breslow thickness (Table 2). Because estimates of some variables can be unstable when the number of variables in the model is high relative to the number of observations, the final model did not include gender, rurality, and primary tumor site. Despite removal of these statistically nonsignificant variables, poverty rate and absolute number of dermatologists were not statistically significantly associated with Breslow thickness. Age remained statistically significantly associated with Breslow thickness in the

multivariate analysis: patients aged 51 to 80 years had 16% thicker tumors than patients aged 0 to 50 years ($P=.04$), and patients older than 80 years had 103% thicker tumors than patients aged 0 to 50 years ($P<.001$). Similarly, distance to diagnosing provider was statistically significant with each 10-mile increase in distance associated with a 6% increase in Breslow thickness ($P=.009$). Even when the analysis was limited to tumors less than 2.0-mm thick, Breslow thickness increased by 5% for every 10-mile increase in distance ($P=.002$). Further exploration was performed to identify predictors of distance to diagnosing provider. Age, sex, and primary tumor site were unassociated with distance to diagnosing provider ($P>.05$) (Table 3). Although there was a statistically significant difference in distance traveled according to the specialty of the provider, the difference was too small to be clinically relevant: compared with patients whose melanomas were diagnosed by dermatologists, patients whose melanomas were diagnosed by surgeons traveled on average 1.3 miles farther ($P=.03$). The difference in distance to diagnosing provider between patients whose melanomas were diagnosed by dermatologists and those whose melanomas were diagnosed by nonsurgeon and nondermatologist providers was not statistically significant. The difference in distance to diagnosing provider based on poverty rate was also too small to be clinically relevant: for every 1% increase in poverty rate, distance decreased by 0.1 miles ($P=.01$).

Patients from rural counties traveled a modest 2.4 miles farther on average than patients from metropolitan counties ($P=.001$). Using the US Department of Agriculture classifications, distance to diagnosing provider was inversely related to the size of the town-dwelling population of the county (Table 3). Compared with patients from metropolitan areas, patients from rural areas were also older (mean age, 58.2 vs 53.7 years, $P=.007$) and were more likely to live in poverty (12.3% vs 9.1%, $P<.001$). There were no statistically significant differences in patient sex or provider specialty between cases from rural areas and those from metropolitan areas.

Patients from counties with at least 1 dermatologist traveled on average 8.3 miles less than patients from counties with no dermatologist ($P<.001$). This association was independent of the specialty of the actual diagnosing physician. In other words, the presence of a dermatologist resulted in a shorter mean distance, even for patients whose melanomas were not actually diagnosed by a dermatologist, suggesting that the presence of a dermatologist does not directly affect distance to diagnosing provider but rather is a marker of an increased supply of local health care resources. To further explore this idea, the dermatologist variable was replaced with other measures of physician supply (number of primary care physicians, number of non-primary care physicians, and total number of physicians). Because they were correlated, only 1 provider supply variable was included in the model at a time. The relationships between each variable and distance to diagnosing provider were similar and substantial, and the magnitudes of the effects of the other coefficients in the model were stable regardless of which measure of provider supply was used.

COMMENT

Findings from previous studies^{1,18–22} suggest that education, socioeconomic status, and physician supply may affect stage at diagnosis and prognosis for patients with melanoma. MacKie and Hole¹⁸ examined the medical records of 3142 patients diagnosed as having melanoma in Scotland between 1979 and 1993. They found that patients from the most affluent areas were consistently more likely than those from the least affluent areas to be diagnosed as having a melanoma less than 1.5 mm thick. In addition, patients from the most affluent areas had better stage-adjusted 5-year disease-free survival than those from the least affluent areas (81% vs 73%, $P<.001$). Similarly, examining the medical records of patients with melanoma in Massachusetts from 1982 to 1987, Geller et al¹⁹ found that there was a

higher mortality to incidence ratio for patients from lower socioeconomic status areas compared with patients from more affluent areas (0.33 vs 0.27, $P < .05$), and patients from lower socioeconomic status areas were more likely to have distant or regional metastases at diagnosis (rate ratio, 1.64, 95% confidence interval, 1.20–2.25). Investigations of incident melanoma cases in Florida in 1994 examined physician supply and rurality, as well as socioeconomic status and education.^{20–22} Using area-based measures of each factor, investigators found that advanced-stage disease, defined by distant or regional metastases, was associated with education and physician supply but not with socioeconomic status or rurality.

To our knowledge, this study is the first to examine distance to diagnosing provider and area-based sociodemographic measures. Breslow thickness at diagnosis was directly related to distance to diagnosing provider, but there were no statistically significant associations between poverty rate, rurality, or provider supply and Breslow thickness. It is possible that associations existed but were too small to detect in a study of this size. However, the differences between our findings and those of previous investigators^{18,19} might also be attributed to the inclusion of potential confounders such as patient age and travel distance.

Because provider specialty cannot directly affect Breslow thickness, provider specialty was not included in our multivariate analysis of factors affecting Breslow thickness. Still, the differences in Breslow thickness among different types of providers are interesting. In general, dermatologists may perform a larger volume of routine screening skin examinations than other providers. Consequently, the smaller Breslow thickness for cases diagnosed by dermatologists compared with those diagnosed by surgeons and other providers may reflect the effect of screening on early detection of melanoma.

DISTANCE TO DIAGNOSING PROVIDER

Little is known about the relationship between distance to diagnosing provider and stage at diagnosis for patients with cancer. Rushton et al³³ examined distance to diagnosing provider for patients with colon cancer and found that patients who traveled longer distances were more likely to be diagnosed as having late-stage disease. In our study, Breslow thickness increased 0.6% for every 1-mile increase in distance to diagnosing provider. Consequently, a 10- to 15-mile increase in distance could explain a clinically relevant difference in Breslow thickness. The relationship between distance to diagnosing provider and Breslow thickness was linear for all travel distances except the most extreme: Breslow thickness began to decline for the 1% of patients who traveled more than 120 miles. These cases may represent statistical outliers, or they may be systematically different from the remainder of the population. Studies^{15,24} have shown a protective benefit for patients who travel long distances; it is theorized that these cases represent the most empowered patients, who are not hindered by barriers such as travel distance.

Investigations addressing travel distance often examine distance to the nearest provider, which is by definition a proxy for geographic isolation.¹⁷ We found that many patients bypassed local providers on their way to the actual diagnosing provider (Figure 1). Consequently, we know that distance to diagnosing provider captures more than just distance to the nearest provider. Of the factors examined, the greatest predictor of distance to diagnosing provider was the supply of providers in the county. Still, only a few clinical and sociodemographic factors could be explored using our data set. It is likely that many other factors influence distance to diagnosing provider. Most important, the role of the referring provider and the effect of health insurance could not be explored. The conceptual model shown in Figure 3 includes some of the factors that may ultimately affect the “choice” of diagnosing provider. Further work is needed to delineate which factors most directly affect distance, and consequently access, to the diagnosing physician.

STUDY LIMITATIONS

Euclidian distance was used for this study. Although not as precise as road distance, Euclidian distance has been shown to be a meaningful measure of travel distance for geographic areas without major topographical barriers.²⁸ Our study was limited by the chosen ascertainment area of the Genes, Environment, and Melanoma study. Although many rural counties were included, some mountain and coastal areas of the state were not included. These excluded areas contain substantial topographical barriers, including mountains and waterways. While this limits generalizability of our results, it is reasonable to infer that any disparity identified based on rurality or distance to diagnosing provider would only be magnified if more geographically isolated areas were included.

Referral bias can confound attempts to examine the effect of distance to diagnosing provider. For tumors in which the size is apparent before a diagnosis is confirmed, large tumors may be preferentially referred to high-volume centers. Because Breslow thickness cannot be accurately determined without a biopsy specimen,³⁴ this should not have been an issue in our study. Still, there is some evidence to suggest that careful clinical examination combined with dermatoscopic examination can differentiate thin melanomas from intermediate or thick lesions.³⁵ As a result, it is possible that some patients were referred to surgeons before a biopsy was performed based solely on worrisome clinical examination. Such referral bias could contribute to the differences in the mean thickness between melanomas diagnosed by dermatologists and those diagnosed by surgeons. However, patients whose melanomas were diagnosed by surgeons traveled on average only 1.3 miles farther than patients whose melanomas were diagnosed by dermatologists. Consequently, preferential referral of worrisome lesions to surgeons alone cannot explain the relationship between Breslow thickness and travel distance. Further support for the limited role of referral bias is provided by the fact that fewer than 5% of patients had tumors greater than 4.0mmthick, and the relationship between distance and Breslow thickness was constant even when cases with tumors greater than 2.0 mm thick were excluded from analysis.

Information on the interval between initial patient encounter and diagnostic biopsy was unavailable for this study. The relationship between distance traveled and delay in diagnosis should be addressed in future studies. It is likely that time to diagnosis and travel distance are intermediate outcome measures that capture similar information about access to care.

CONCLUSIONS

For this population, distance to diagnosing provider seems to be a more complete measure of access to a melanoma diagnosis than proxy measures of rurality, socioeconomic status, and provider supply. Distance to diagnosing provider is not simply a measure of geographic isolation, as many patients bypass closer providers on their way to the diagnosing provider. The farther that patients travel to reach their diagnosing providers, the more advanced their stage at diagnosis is likely to be. Although we do not yet have survival data, it is reasonable to surmise that differences in Breslow thickness at diagnosis could translate into differences in overall survival.^{1,3} However, on a population-level these differences will likely be too small to be meaningful or to even detect because most patients are diagnosed as having thin melanoma and already have greater than 90% survival.

Further work is needed to characterize the determinants of distance to diagnosing provider, as well as the pathways and barriers to melanoma care. Once potential barriers are identified, interventions can be developed to minimize the effect of travel distance and other sociodemographic factors on access to melanoma care. Such interventions could potentially translate to other settings in which access to specialists is critical to patient outcomes.

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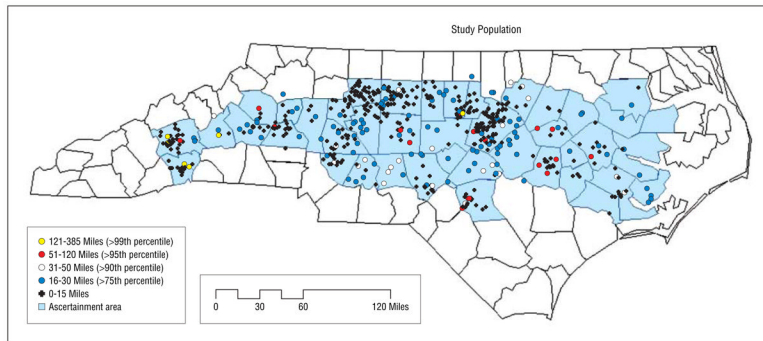


Figure 1. Distance traveled to diagnosing provider. Each data point represents the location of an incident case of melanoma. Points are color coded according to distance traveled to diagnosing provider.

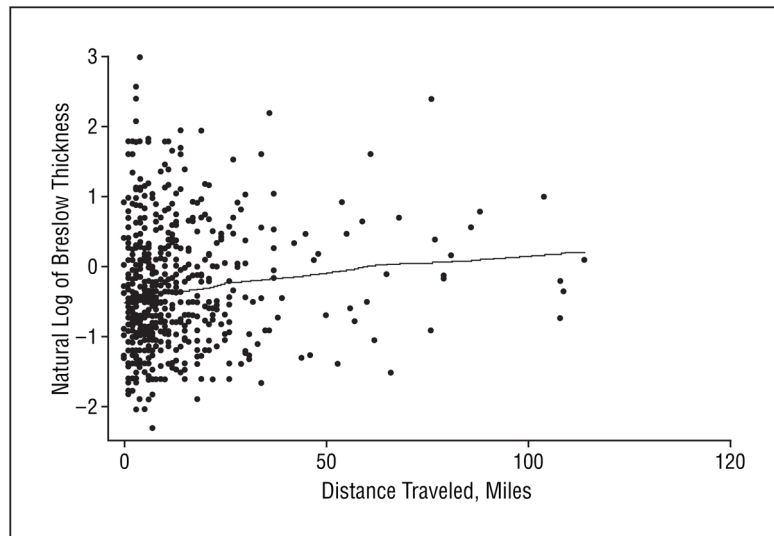


Figure 2. Bivariate relationship between Breslow thickness and distance traveled to diagnosing provider. The natural log of Breslow thickness is plotted against the distance traveled for a given case. The line represents the lowess, a locally weighted regression of the natural log of Breslow thickness on distance traveled. The bandwidth for the regression is 0.8. The 1% of outlier patients who traveled more than 120 miles were excluded.

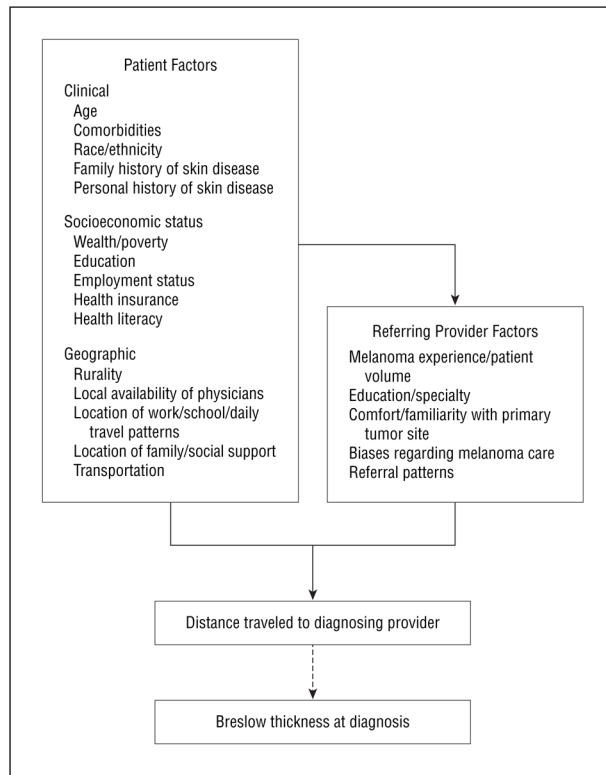


Figure 3. Conceptual model of factors that may affect distance to diagnosing provider.

Table 1Clinical and Sociodemographic Characteristics of the Study Population^a

Characteristic	No. ^b	Median (Range)
Breslow thickness, mm	615	0.6 (0.1–20.0)
Distance to diagnosing provider, miles	615	8 (0–386)
Age, y	614	55 (10–97)
Census tract poverty rate	615	8.1 (0.7–43.9)
Dermatologists in county, No.	615	6 (0–30)
Density of dermatologists in county, No. per 100 000 population	615	4.3 (0–19.5)
T classification		
1	426	69.3
2	116	18.9
3	45	7.3
4	28	4.5
Sex		
Male	333	54.1
Female	282	45.9
Rurality		
Metropolitan	478	77.7
Rural	137	22.3
Dermatologists in county		
Present	530	86.2
Absent	85	13.8
Primary tumor site		
Head or neck	121	20.3
Trunk	263	44.0
Upper extremity	116	19.4
Lower extremity	97	16.3
Specialty of diagnosing provider		
Dermatologist	373	63.2
Surgeon	171	29.0
Other	46	7.8

^aData are given as percentages unless otherwise indicated.^bThe total number of participants varies because of missing data.

Table 2

Predictors of Breslow Thickness at Diagnosis

Predictor	% Change (95% Confidence Interval) ^a		
	<i>R</i> ² = 0.07		
	Bivariate	Multivariate, All Variables (n = 596)	Multivariate, Final Model (n = 614)
Distance traveled, 0–12 miles, continuous	0.6 (0.2 to 1.1) ^b	0.5 (0.1 to 1.0) ^c	0.6 (0.1 to 1.0) ^b
Distance traveled, 120–386 miles, continuous	–1.20 (–2.20 to –0.04) ^c	–1.10 (–2.10 to –0.03) ^c	–1.10 (–2.10 to –0.06) ^c
Age, y			
0–50	1 [Reference]	1 [Reference]	1 [Reference]
51–80	19.2 (3.4 to 37.3) ^c	14.0 (–1.9 to 32.4)	16.3 (0.9 to 34.1) ^c
> 80	108.9 (57.4 to 177.2) ^d	101.7 (49.9 to 171.3) ^d	102.7 (53.0 to 168.5) ^d
Census tract poverty rate, continuous	1.00 (0.06 to 2.00) ^c	0.3 (–0.7 to 1.3)	0.6 (–0.4 to 1.6)
Dermatologists in county, continuous	–0.9 (–1.5 to –0.3) ^b	–0.70 (–1.40 to 0.02)	–0.5 (–1.1 to 0.1)
Primary tumor site			...
Head or neck	17.7 (–2.4 to 42.0)	4.8 (–13.5 to 27.0)	
Trunk	1 [Reference]	1 [Reference]	
Upper extremity	6.1 (–12.3 to 28.3)	3.1 (–14.9 to 24.9)	
Lower extremity	10.8 (–9.5 to 35.7)	10.1 (–10.5 to 35.3)	
Sex			...
Female	1 [Reference]	1 [Reference]	
Male	6.5 (–7.3 to 22.3)	7.6 (–7.0 to 24.4)	
Rurality			...
Metropolitan	1 [Reference]	1 [Reference]	
Rural	5.1 (–11.0 to 24.1)	–8.7 (–24.3 to 10.2)	

Abbreviation: Ellipses, not applicable.

^aResults are given as the percentage change in Breslow thickness associated with a 1-U change in the independent variable. For patient characteristics that are captured as dichotomous variables (categorical variables), the percentage change in tumor thickness compared with the reference category was calculated by subtracting 1 from the exponent of the β coefficient ($e^{\beta}-1$).

^b*P* .01.

^c*P* < .05.

^d*P* .001.

Table 3

Predictors of Distance to Diagnosing Provider

Predictor	Change (95% Confidence Interval) ^a	
	Bivariate	Multivariate, All Variables (n = 595)
Age, continuous	-0.007 (-0.040 to 0.030)	-0.020 (-0.050 to 0.008)
Census tract poverty rate, continuous	-0.005 (-0.090 to 0.080)	-0.10 (-0.18 to -0.02) ^b
Dermatologists in county, present or absent	-10.44 (-11.92 to -8.96) ^c	-8.27 (-9.95 to -6.59) ^c
Primary tumor site		
Head or neck	0.10 (-1.56 to 1.76)	0.64 (-0.83 to 2.11)
Trunk	1 [Reference]	1 [Reference]
Upper extremity	-0.28 (-1.97 to 1.40)	-0.37 (-1.84 to 1.11)
Lower extremity	-0.07 (-1.87 to 1.73)	-0.16 (-1.74 to 1.42)
Sex		
Female	1 [Reference]	1 [Reference]
Male	0.48 (-0.73 to 1.69)	-0.13 (-1.26 to 0.99)
Rurality ^d		
<2500 Nonmetropolitan	15.87 (10.05 to 21.69) ^c	8.94 (3.28 to 14.61) ^e
2500–20 000 Nonmetropolitan	18.64 (14.43 to 22.84) ^c	14.38 (10.39 to 18.36) ^c
>20 000 Nonmetropolitan	5.68 (2.23 to 9.13) ^c	3.25 (-0.01 to 6.52)
<250 000 Metropolitan	2.07 (-1.68 to 5.83)	1.87 (-1.67 to 5.42)
250 000–1 000 000 Metropolitan	3.16 (-0.08 to 6.40)	2.49 (-0.52 to 5.51)
>1 000 000 Metropolitan	1 [Reference]	1 [Reference]
Specialty of diagnosing provider		
Dermatologist	1 [Reference]	1 [Reference]
Surgeon	1.45 (0.14 to 2.77) ^b	1.29 (0.11 to 2.47) ^b
Other	-2.88 (-13.24 to 7.49)	-2.43 (-11.46 to 6.60)

^aResults are given as the absolute change in distance in miles associated with a 1-U change in the independent variable. For dichotomous variables, this is the absolute change in distance in miles compared with the reference category. The specialty of the diagnosing provider was unavailable for one case that has been included in the analysis.

^b $P < .05$.

^c $P < .001$.

^dRurality based on US Department of Agriculture Rural Urban Classification Codes. Numbers represent the size of the town-dwelling population of the county. Nonmetropolitan counties do not contain or are not part of a metropolitan area. Metropolitan counties contain or are part of a metropolitan area.

^e $P < .01$.