

# Geographic Distance to Treatment Center Influences Demographics and Treatment Patterns in Soft Tissue Sarcoma: A National Cancer Database Analysis

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**INTRODUCTION:** Access to timely, specialized care is a critical determinant of outcomes in the management of soft tissue sarcoma (STS). Prior analyses using national datasets have demonstrated associations between greater travel distance and variations in treatment delivery and survival; however, few studies have evaluated how these relationships differ across geographic regions within the United States. This study investigates the impact of distance to the treating facility on patient demographics, treatment patterns, and clinical characteristics, while also assessing regional variation in these associations using data from the National Cancer Database (NCDB).

**METHODS:** A retrospective cohort analysis was conducted using 2004-2021 NCDB data from 1,352 patients diagnosed with STS who underwent surgical resection. Patients were stratified by distance to treating facility: ≤10 miles, 11–50 miles, 51–100 miles, and >100 miles. Demographics, tumor characteristics, facility type, treatment timelines, and adjuvant radiation use were compared across distance groups. Subgroup analyses were performed by geographic region (Northeast, South, Midwest, West).

**RESULTS:** Patients residing farther from treatment centers were more likely to be white (p<.001), reside in non-metropolitan areas (p<.001), and receive care at academic centers (p<.001). Longer travel distance correlated with lower rates of gross total resection (p<.001), decreased receipt of radiation (p=.007), and delayed time from diagnosis to surgery (p=.007). Regional analysis revealed consistent trends, particularly in the Northeast and South, where increased distance was associated with reduced radiation use and greater reliance on academic centers. No significant differences were observed in tumor volume or comorbidity burden across distance strata (p<.05). Importantly, mortality outcomes were similar (p<.05) across all distance groups, even when accounting for geographic region.

**DISCUSSION AND CONCLUSION:** While distance to the treating facility is associated with differences in patient demographics, facility type, treatment approach, and care timelines, no differences in mortality rates were observed. These findings highlight that while access-related disparities exist and should be addressed, they may not translate to worse survival, emphasizing the need to address barriers to care without assuming uniform impact on outcomes.

Table 1. Analysis of demographics and medical history by Distance to Healthcare Facility (n=1352)

Variable	≤10 Miles	11-50 Miles	51-100 Miles	>100 Miles	p-value
<b>Age (yr): Mean (SD)</b>	60 (4.2)	60 (5.1)	60 (5.2)	60 (5.0)	.015
<b>Sex</b>					
Male	341 (85.3)	323 (84.3)	301 (78.0)	325 (82.6)	
Female	171 (42.5)	178 (46.5)	174 (45.0)	184 (47.4)	
<b>Race</b>					<.001
White	301 (75.5)	400 (102.8)	446 (116.4)	508 (130.0)	
Black	30 (7.4)	39 (10.0)	35 (9.0)	35 (9.0)	
Asian	15 (3.7)	17 (4.3)	14 (3.6)	15 (3.8)	
<b>Urban</b>	41 (10.2)	20 (5.1)	14 (3.6)	10 (2.6)	<.001
<b>Residential Area</b>					
Urban	32 (8.0)	25 (6.4)	20 (5.2)	20 (5.1)	
Suburban	111 (27.8)	97 (25.0)	92 (23.7)	77 (19.7)	
Rural	6 (1.5)	7 (1.8)	7 (1.8)	6 (1.5)	
<b>Education</b>	100 (25.0)	74 (18.8)	70 (17.9)	61 (15.5)	<.001
<b>Facility Type</b>					
Community Cancer Program	20 (5.0)	7 (1.8)	6 (1.5)	1 (0.2)	
Comprehensive Community Cancer Program	30 (7.5)	30 (7.6)	22 (5.7)	15 (3.8)	
Academic Research Program	169 (42.0)	225 (58.2)	300 (77.4)	333 (84.0)	
Integrated Network Cancer Program	69 (17.4)	70 (18.0)	53 (13.6)	30 (7.6)	
<b>Geographic Zone</b>					<.001
Northeast	92 (23.0)	57 (14.7)	54 (13.9)	33 (8.4)	
South	106 (26.6)	127 (32.7)	141 (36.2)	114 (29.0)	
Midwest	86 (21.4)	100 (25.9)	74 (18.9)	40 (10.2)	
West	58 (14.6)	70 (18.0)	57 (14.6)	35 (8.9)	
<b>Charlson Comorbidity Score</b>					.199
0	144 (36.2)	148 (38.4)	150 (38.6)	150 (38.6)	
1	69 (17.3)	67 (17.2)	57 (14.5)	70 (17.9)	
2	70 (17.6)	78 (20.0)	74 (18.9)	51 (12.9)	
<b>Tumor Location</b>					.017
Upper Extremity	241 (60.5)	190 (49.2)	169 (43.6)	152 (38.7)	
Lower Extremity	101 (25.2)	120 (31.1)	102 (26.4)	90 (22.9)	
Trunk	42 (10.5)	41 (10.6)	38 (9.7)	31 (7.8)	
Head	8 (2.0)	7 (1.8)	7 (1.8)	5 (1.3)	
<b>Tumor Volume (cm<sup>3</sup>)</b>	107 (26.7)	107 (27.7)	106 (27.1)	107 (27.1)	.531
<b>Extent of Resection</b>					<.001
GTR	92 (23.0)	67 (17.3)	25 (6.4)	30 (7.6)	
STR	251 (62.8)	289 (74.8)	270 (69.3)	270 (69.3)	