

The Impact of Socioeconomic Deprivation on Timing and Long-term Outcomes of Cleft Surgery: A 30-Year Retrospective Analysis

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Background

- Delayed cleft surgery can affect nutrition, social integration, and speech.
- While sociodemographic factors in cleft care are well-characterized, the impact of neighborhood-level socioeconomic deprivation on surgery timing and outcomes like palatal fistula and velopharyngeal insufficiency (VPI) is less explored.

Objective

- This study aims to use the ADI to explore sociodemographic factors that contribute to the age at cleft surgery at a single institution tertiary care children’s hospital.

Methods

- Retrospective review children undergoing cleft lip and palate repair by a single tertiary children’s hospital from 1995 to 2024
- Data collected include:
 - Demographics
 - Age at surgery (CL, CP, VPI)
 - Postoperative palatal fistula, time to repair from diagnosis
 - Distance from hospital (km)
 - Area of Deprivations Index (ADI) State Specific Percentile (Scale is from 1-10)
 - Insurance status
- Patients stratified by ADI Deprivation Cohorts:
 - Low: ADI 1-3, Medium: ADI 4-6, High: ADI 7-10
- Inclusion Criteria: Patients with both cleft lip and palate
- Exclusion Criteria: Syndromic patients, repair at OH
- Delays were defined as cleft lip repair after 6 months and palatoplasty after 12 months.
- Statistical Analysis
 - Chi-square test for categorical variables
 - Wilcoxon rank-sum test for continuous variables
 - Multivariable logistic regression

Table 1. Impact of Socioeconomic Deprivation on Timing of CL, CP, Palatal Fistula Repair, and VPI Surgery					
	ADI 1-3 n= 139	ADI 4-6 n= 371	ADI 7-10 n= 192	Total n= 702	p-value
Age at CL Repair (Months)	3.2 ± 1.5	6.0 ± 10.5	5.4 ± 6.6	5.3 ± 8.5	0.004*
Delayed CL Repair (n, %)	12 (8.7%)	67 (18.1%)	40 (20.9%)	119 (17.0%)	0.010*
Age at CP Repair (Years)	1.1 ± 0.4	1.7 ± 2.8	1.8 ± 2.9	1.6 ± 2.6	0.016*
Delayed CP Repair (n, %)	49 (35.3%)	185 (49.9%)	87 (45.3%)	321 (45.9%)	0.013*
	ADI 1-3 n= 129	ADI 4-6 n= 359	ADI 7-10 n=186	Total n= 674	p-value
Postoperative Fistula	18 (13.9%)	65 (18.1%)	31 (16.7%)	114 (16.9%)	0.556
Fistula Dx to Repair (Months)	5.6 ± 4.4	8.7 ± 10.1	19.9 ± 25.0	11.1 ± 15.6	0.009*
	ADI 1-3 n=120	ADI 4-6 n=343	ADI 7-10 n=172	Total n=635	p-value
VPI Surgery (n, %)	16 (13.3%)	58 (16.9%)	21 (12.2%)	95 (14.9%)	0.317
Age at VPI Surgery (Years)	8.6 ± 3.2	8.1 ± 2.8	8.3 ± 4.3	8.3 ± 3.3	0.858

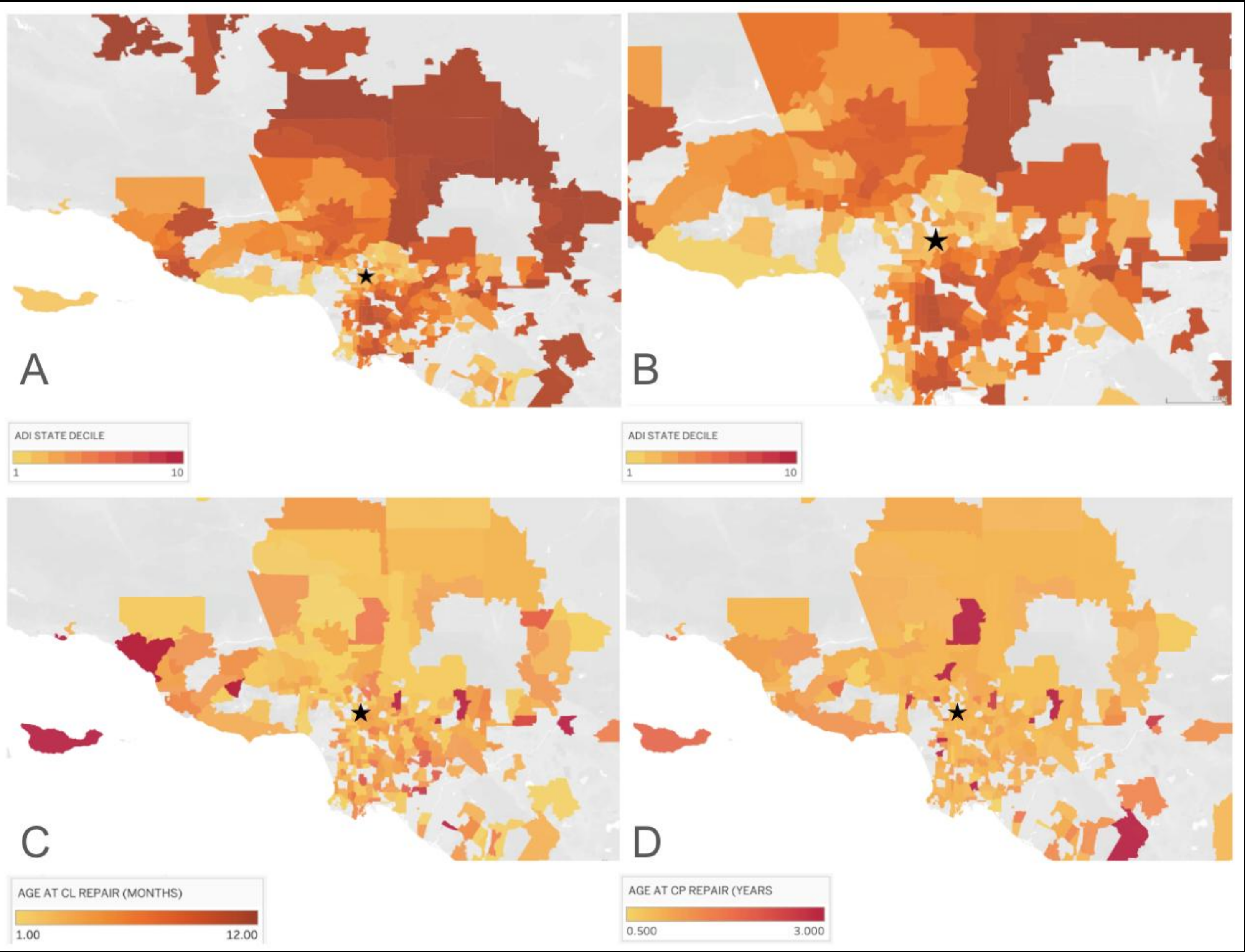


Figure 1. Distribution of age at surgical repair and ADI by ZIP code. Heat map showing (A) ADI based on ZIP code, (B) ADI based on ZIP code, zoomed in, (C) age at cleft lip repair surgery based on ZIP code, and (D) age at cleft palate repair surgery based on ZIP code.

Results

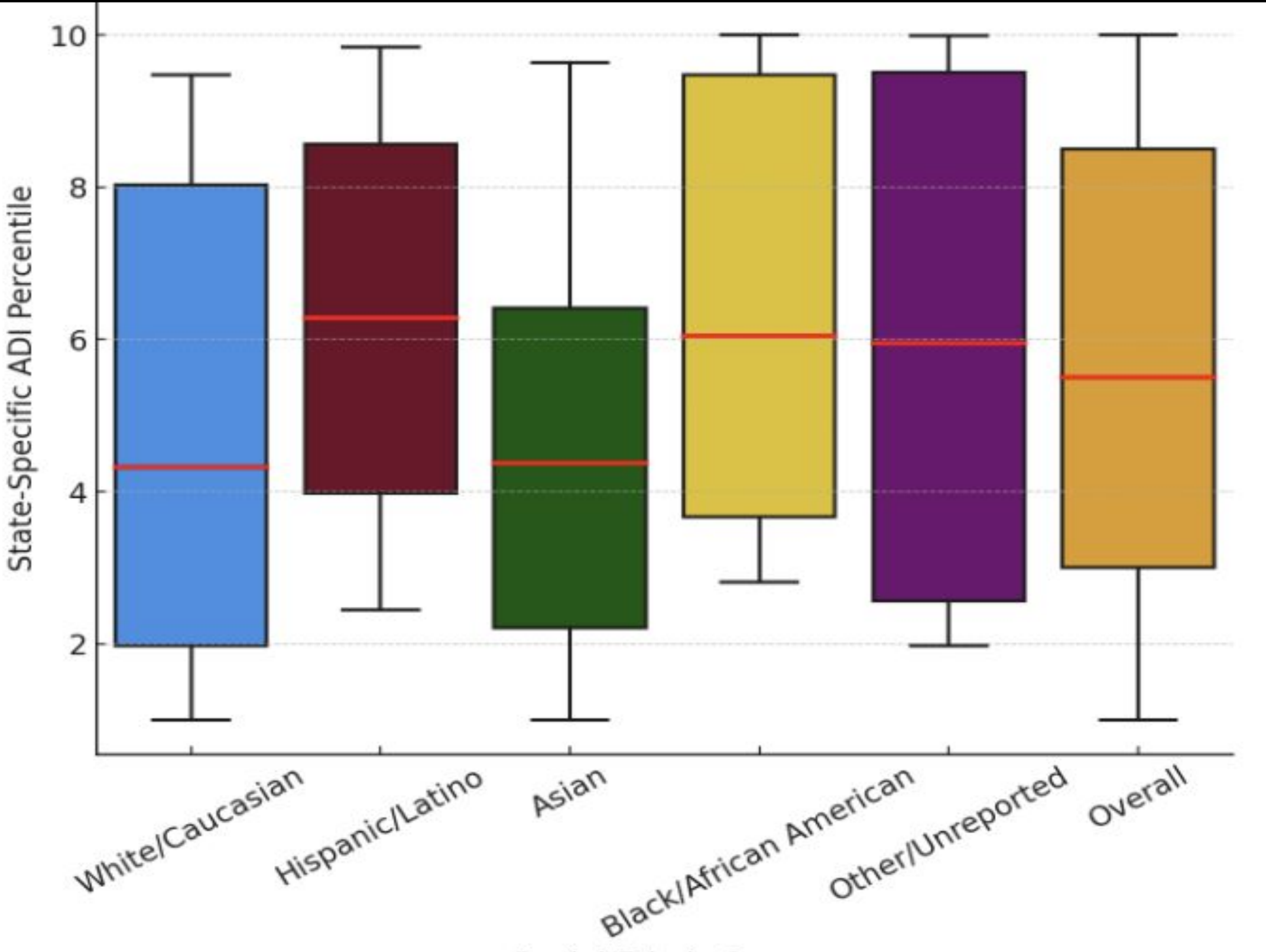


Figure 2. The distribution of state-specific ADI scores varied across racial and ethnic groups. (p<0.001).

- Logistic regression identified high ADI and female sex as independent predictors of CL delay (p<0.001), while public insurance, race, greater hospital distance, and prior CL delay contributed to CP repair delays (p<0.001).
- Palatal fistula rates (14.9%) were not linked to ADI, but high ADI patients had longer times to repair (p<0.05).
- Patients undergoing VPI surgery lived closer to the hospital than those not requiring repair(p<0.05).

Conclusions

- Patients from higher ADI neighborhoods had longer times to palatofistula repair, whereas those undergoing VPI surgery lived closer to the hospital, underscoring the role of geographic barriers in care access. Importantly, follow-up duration after cleft lip repair did not significantly differ across ADI categories, suggesting institutional efforts may help sustain equitable long-term care.