

Where are the Robots?

Katherine Bingmer,¹ Maher Kazimi,² Victoria Wang,³ Asya Ofshteyn,¹
Emily Steinhagen,¹ Sharon L. Stein¹

¹UH-RISES, Department of Surgery, University Hospitals Cleveland Medical Center

²Case Western Reserve University

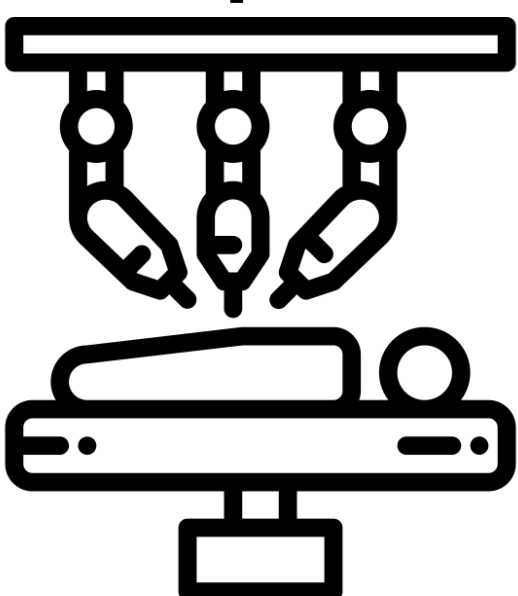
³Case Western Reserve University School of Medicine

Background

- Access to robotic surgery varies by patient race and ethnicity as well as insurance status
- The majority of these studies are large database analyses that offer little in the way of detailing the contributing factors behind these inequities
- This study aimed to determine if distribution of populations in geographic proximity to hospitals with robots (HWR) match known disparities in access to robotic surgery

Methods

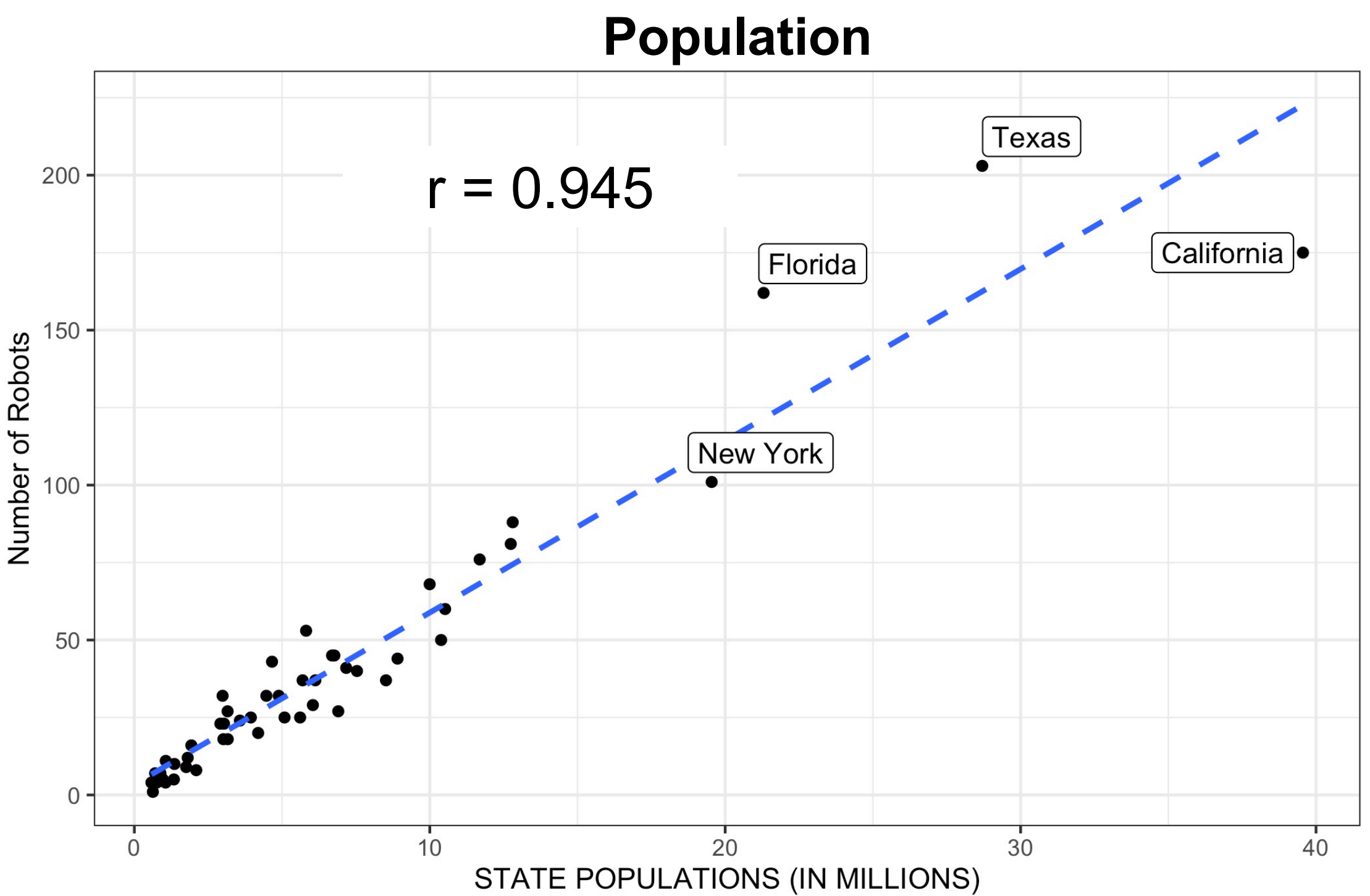
- National and State Analysis
- Population Data:
 - U.S. Census Bureau-American Community Survey
 - Kaiser Family Foundation-State Health Facts
 - County Health Rankings and Roadmaps
 - Texas Association of Counties
- Robot Data:
 - Da Vinci Surgeon Locator



Results

Multivariate Model of HWR in Texas Counties

Variable	Odds Ratio	95% CI
County Population	1.97	1.40 - 3.38
High School graduate	1.64	1.07 - 3.21
Unemployment Rate	1.30	0.25 – 5.10
Urban	1.15	1.05 - 1.31
Median Household income	1.00	1.00 - 1.00
White	1.73	0.72 – 4.18
African American	1.80	0.67 – 4.76
Uninsured	1.04	0.65 – 1.65
Total Area	0.99	0.99 – 1.00



Results

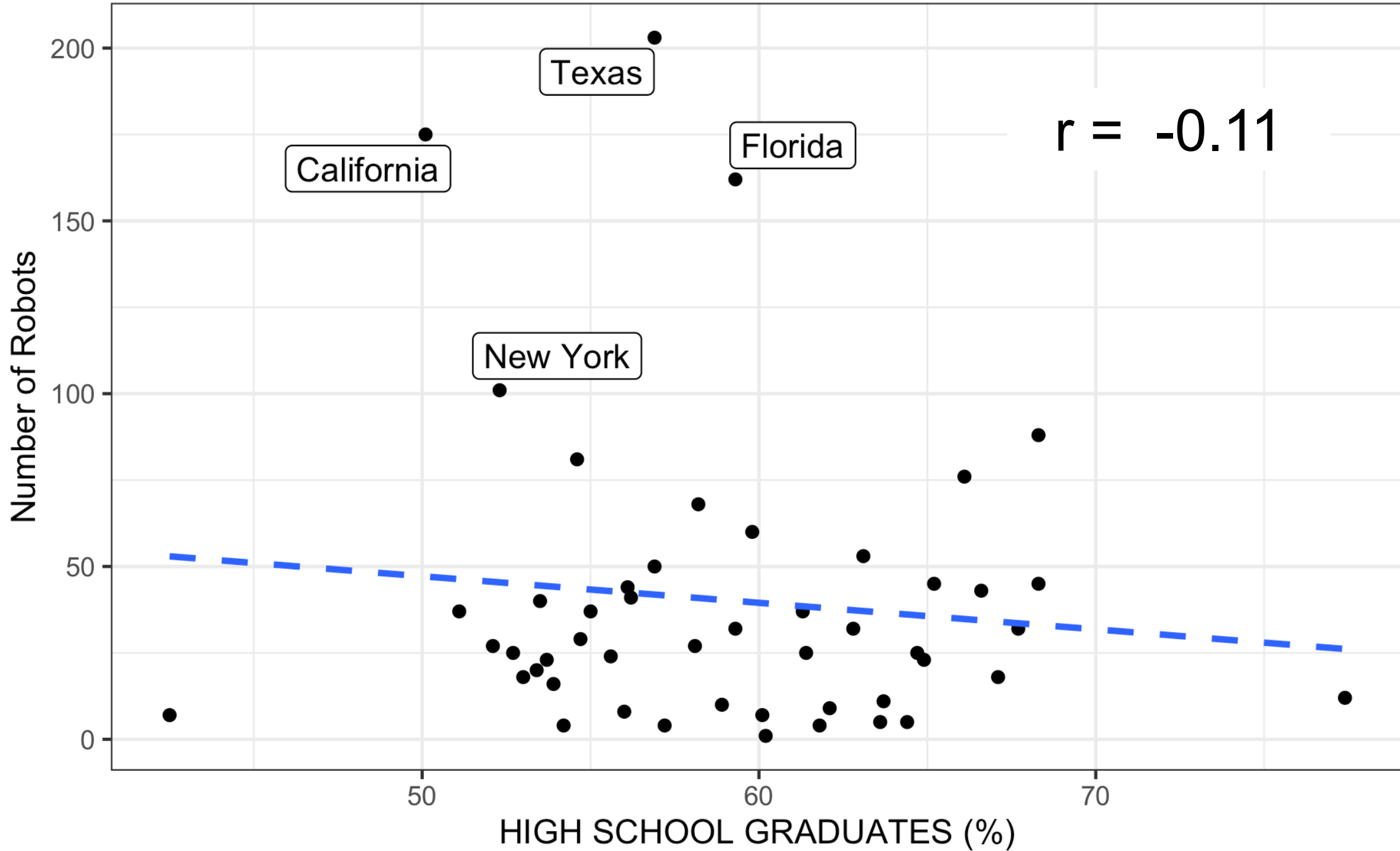
States with Most HWR

Location	Population	Hospitals	HWR
Texas	28,701,845	528	203
California	39,557,045	362	175
Florida	21,299,325	220	162
New York	19,542,209	168	96
Pennsylvania	12,807,060	201	87
Illinois	12,741,080	189	80
Ohio	11,689,442	198	73
Michigan	9,995,915	145	67
Georgia	10,519,475	147	57
North Carolina	10,383,620	114	50
Wisconsin	5,813,568	134	50

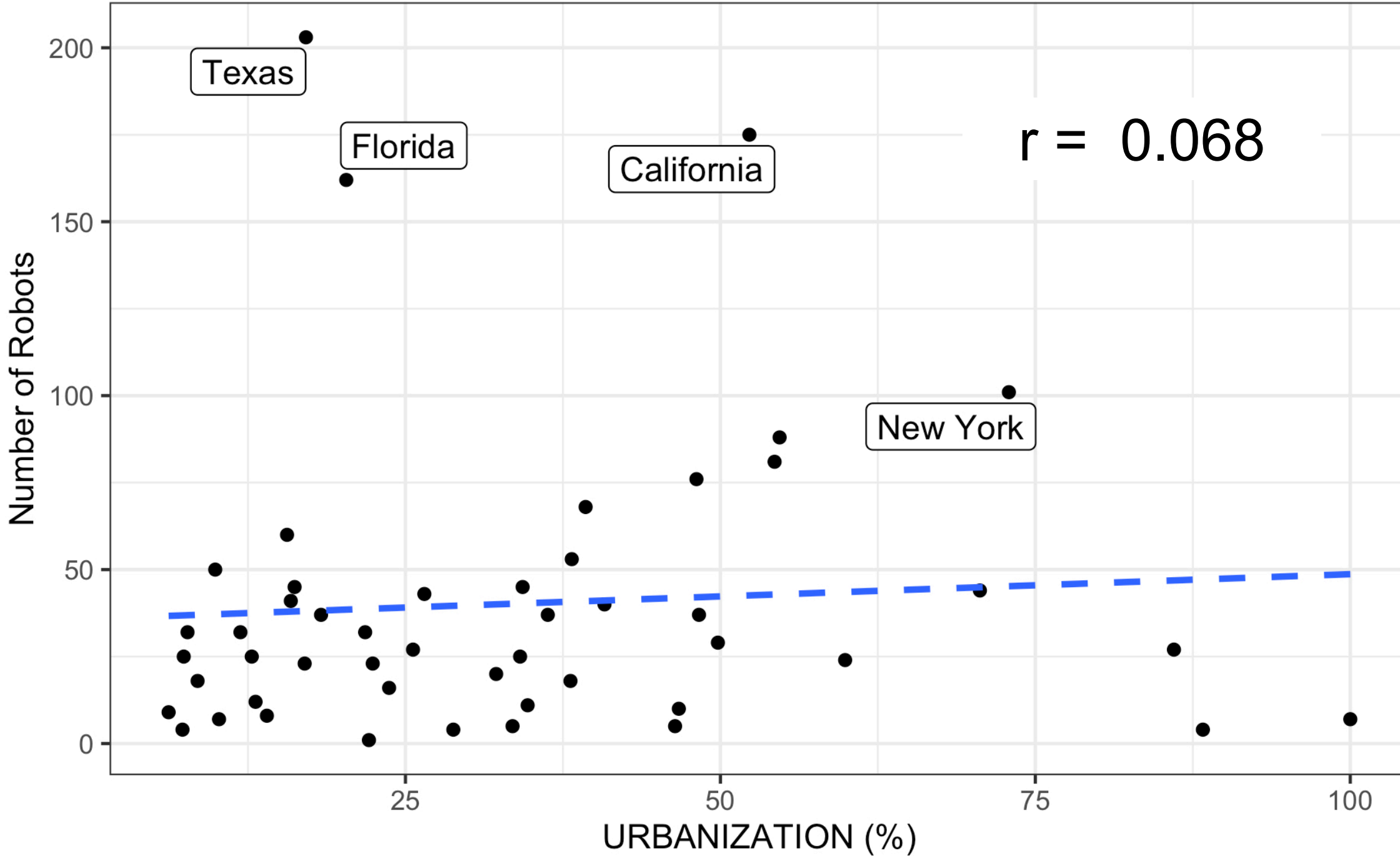
Comparison of Texas Counties

Variable	No HWR	HWR	p-value
Number of counties	138	43	
Mean Population	28,479	554,975	<0.001
Race White (%)	89.7	82.2	<0.001
Race Non-White (%)	10.3	17.8	<0.001
High School Graduate (%)	78	84.4	<0.001
Bachelor Degree (%)	15.8	27	<0.001
Uninsured (%)	24.6	21.1	<0.001
Median Household Income	47,520	59,321	<0.001
Population in Poverty (%)	17	14.5	0.004
Urban (%)	45.6	81.6	<0.001
Population density	28.4	494.8	<0.001

High School Graduates



Urbanization



Conclusions

- Previously published disparities in robotic surgery cannot be explained by sociodemographic factors related to the geographic proximity of HWR
- Other biases are involved in the lack of robotic procedures performed among minority and underprivileged populations