

Abstract

Through spatial and statistical analysis, this study aimed to determine if there is statistically significant evidence that suggests poor transport infrastructure plays a role in the social injustice theory. The problem of scale is addressed through analysis on three separate geographies: the county level, the census tract level, and the county subdivision level. Performing analysis on all three geographies will provide insight into which is the most appropriate scale to consider transport infrastructure's role in the social injustice theory.







Pennsylvania



Socioeconomic Status and Bridge Sufficiency Ratings Colin Murtoff, West Chester University Department of Geography & Planning

Descriptive Statistics

T-Test Group Statistics (County)										
	Group	NI	Moan	Standard	Standard					
			Wear	Deviation	Error Mean					
No High School	1	17	12.5	2.57536	0.62462					
	3	22	11.6636	2.84296	0.60612					
Bachelors Degree or Higher	1	17	21.688	6.8078	1.6511					
	3	22	20.173	8.1276	1.7328					
Madian Hausahald Incoma	1	17	48088.294	6149.5944	1491.4957					
	3	22	49807.682	10820.3502	2306.9064					
Vacancy Pata	1	17	0.1051	0.03909	0.00948					
vacancy hate	3	22	0.1955	0.13483	0.02875					
Non-White Population	1	17	0.0729	0.05618	0.01363					
	3	22	0.0624	0.05632	0.01201					
Modian Housing Value	1	17	138441.18	34267.88	8311.182					
median nousing value	3	22	141590.91	66162.951	14105.989					
Modian Gross Pont	1	17	683	99.294	24.082					
	3	22	699.55	181.55	38.707					

T-Test Group Statistics (Census Tract)				T-Test Group Statistics (County Subdivision)							
	Group	N	Mean	Standard Deviation	Standard Error Mean		Group	N	Mean	Standard Deviation	Standard Error Mean
No High School	1	149	8.2859	6.64968	0.54476	No Libela Ook ool	1	55	4.07	4.590	.619
	3	68	8.8132	5.69469	0.69058	No High School	3	35	4.63	6.698	1.132
Bachelors Degree or Higher	1	149	33.64	18.009	1.475	Bachelors Degree or Higher	1	55	40.60	27.421	3.697
Dachelors Degree of Higher	3	68	30.57	17.704	2.147		3	35	36.97	20.451	3.457
Median Household Income	1	147	53724.18	26121.92	2154.5	Median Household Income	1	56	57298.89	30446.036	4068.523
	3	68	51521.71	23655.774	2868.684		3	36	54169.56	27332.999	4555.500
Vecency Dete	1	151	0.10233	0.07718	0.00628	Vacancy Rate	1	56	.10312	.06527	.0087
	3	69	0.11666	0.10758	0.01295		3	36	.11717	.08260	.0138
Non White Population	1	151	0.156	0.20789	0.01692	New White Devulation	1	56	.10144	.14981	.0200
Non-white Population	3	69	0.1877	0.24593	0.02961	Non-White Population	3	36	.13472	.19910	.0332
Median Heusing Value	1	145	127200	72641.869	6032.579	Median Housing Value	1	56	135614.29	98298.842	13135.735
Median Housing value	3	68	113516.18	61912.706	7508.018		3	36	131397.22	142106.321	23684.387
Median Gross Rent	1	141	795.61	241.474	20.336	Median Gross Rent	1	53	741.04	217.813	29.919
	3	66	719.33	198.033	24.376		3	35	694.43	147.191	24.880

Results

Independent Samples Test (County)											
		t-test for Equality of Means									
		t d		Significance	Mean	Std. Error	95% Confidence Interval of the Difference				
				(z-talleu)	Difference	Difference	Lower	Upper			
No High School	Equal variances assumed	0.949	37	0.349	0.83636	0.88172	-0.95018	2.62291			
	Equal variances not assumed	0.961	36	0.343	0.83636	0.87036	-0.92881	2.60154			
Bachelors Degree or Higher	Equal variances assumed	0.619	37	0.54	1.5155	2.4494	-3.4474	6.4784			
	Equal variances not assumed	0.633	36.72	0.531	1.5155	2.3935	-3.3354	6.3665			
Madian Hausahald Incoma	Equal variances assumed	-0.59	37	0.562	-1719.3877	2938.4817	-7673.3172	4234.5418			
Integran Household Income	Equal variances not assumed	-0.63	34.35	0.536	-1719.3877	2747.0669	-7300.0143	3861.2389			
Vecency Bete	Equal variances assumed	-2.67	37	0.011	-0.09037	0.03384	-0.15893	-0.02182			
	Equal variances not assumed	-2.99	25.42	0.006	-0.09037	0.03027	-0.15266	-0.02809			
Non White Denulation	Equal variances assumed	0.576	37	0.568	0.01046	0.01817	-0.02635	0.04727			
Non-white Population	Equal variances not assumed	0.576	34.6	0.568	0.01046	0.01816	-0.02642	0.04735			
Median Haveing Value	Equal variances assumed	-0.18	37	0.859	-3149.733	17664.548	-38941.506	32642.041			
Median Housing value	Equal variances not assumed	-0.19	32.91	0.849	-3149.733	16372.375	-36463.186	30163.721			
Median Gross Rent	Equal variances assumed	-0.34	37	0.737	-16.545	48.942	-115.712	82.621			
	Equal variances not assumed	-0.36	33.76	0.719	-16.545	45.587	-109.213	76.122			

Independent Samples

		t-test for Equality of Means									
		t	df	Significance	Mean	Std. Error Difference	95% Confidence Interval of the Difference				
				(z-talleu)	Difference		Lower	Upper			
No High Sobool	Equal variances assumed	-0.57	215	0.572	-0.52733	0.93186	-2.36407	1.30941			
	Equal variances not assumed	-0.6	150.03	0.55	-0.52733	0.87959	-2.26531	1.21065			
Bachelors Degree or Higher	Equal variances assumed	1.169	215	0.244	3.064	2.622	-2.104	8.232			
	Equal variances not assumed	1.176	131.91	0.242	3.064	2.605	-2.089	8.217			
Median Heusehold Income	Equal variances assumed	0.592	213	0.555	2202.478	3721.016	-5132.254	9537.209			
	Equal variances not assumed	0.614	143.02	0.54	2202.478	3587.648	-4889.189	9294.145			
Vacanav Data	Equal variances assumed	-1.12	218	0.263	-0.01432	0.01276	-0.03947	0.01082			
	Equal variances not assumed	-1	101.21	0.322	-0.01432	0.01439	-0.04288	0.01422			
Non-White Bonulation	Equal variances assumed	-0.99	218	0.324	-0.0317	0.03204	-0.09484	0.03144			
	Equal variances not assumed	-0.93	114.14	0.355	-0.0317	0.0341	-0.09925	0.03585			
Median Housing Value	Equal variances assumed	1.341	211	0.181	13683.824	10202.44	-6427.947	33795.594			
	Equal variances not assumed	1.421	151.96	0.157	13683.824	9631.321	-5344.755	32712.402			
Median Gross Rent	Equal variances assumed	2.237	205	0.026	76.277	34.093	9.058	143.495			
	Equal variances not assumed	2.403	152.64	0.017	76.277	31.745	13.56	138.993			

Independent Samples Test (County Subdivision)										
		t-test for Equality of Means								
		t df Significanc Mean Std. Error 95%		95% Confider of the Dif	95% Confidence Interval of the Difference					
				(z-talleu)	Difference	Difference	Lower	Upper		
No High School	Equal variances assumed	463	88	.644	551	1.189	-2.915	1.813		
NO HIGH SCHOOL	Equal variances not assumed	427	54.300	.671	551	1.290	-3.138	2.035		
Bachelors Degree or Higher	Equal variances assumed	.672	88	.503	3.627	5.397	-7.098	14.353		
	Equal variances not assumed	.717	85.685	.476	3.627	5.062	-6.435	13.690		
	Equal variances assumed	.500	90	.618	3129.337	6253.774	-9294.876	15553.551		
Median Household Income	Equal variances not assumed	.512	80.507	.610	3129.337	6107.819	-9024.435	15283.110		
Vacanov Pata	Equal variances assumed	907	90	.367	01405	.01549	04482	.01673		
vacancy Rate	Equal variances not assumed	862	62.346	.392	01405	.01629	04662	.01853		
Non White Dopulation	Equal variances assumed	913	90	.364	03328	.03646	10572	.03916		
Non-white Population	Equal variances not assumed	859	60.053	.394	03328	.03876	11080	.04424		
Medien Heusing Volue	Equal variances assumed	.168	90	.867	4217.063	25057.080	-45563.198	53997.325		
Median Housing value	Equal variances not assumed	.156	56.445	.877	4217.063	27083.163	-50027.596	58461.723		
Median Gross Rent	Equal variances assumed	1.109	86	.271	46.609	42.038	-36.959	130.178		
	Equal variances not assumed	1.198	85.935	.234	46.609	38.912	-30.746	123.965		



Statistical significance is indicated by a value below the alpha level of 0.05 (Shown in red)

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GIS

- subdivision, and census tracts)
- geography

Statistical Analysis

- across scales
- County: Quartiles
- Census tract: Median +/- 1 standard deviation
- County subdivision: 3 equal groups
- SD bridge count

Statistics

County:

- structural deficiency
- **Census Tract:**
- structural deficiency
- **County Subdivision:**
- structural deficiency

Scale

To solve the modifiable areal unit problem, it is important to consider the context of the study. This study was performed with focus on the social injustice theory. In this case, the smallest geography, or census tracts, is considered the "right" scale as these smaller geographies will better represent the underprivileged communities that exhibit low socioeconomic status.



Methods

Create visual representations of percent structurally deficient bridges for each level of geography (county, county

Create visual representations of structurally deficient bridge locations across each level of geography

> Determine the number of structurally deficient bridges in each

> Determine break points in "Percent Structurally Deficient" data across geographies as a result of differences in the distribution

> Compute descriptive statistics for each socioeconomic status variable in geographies "high" in SD bridge count and "low" in

> Derive the difference in means between geographies "high" in SD bridge count and "low" in SD bridge count for each variable of socioeconomic status

Conclusions

> Vacancy Rate is a statistically significant indicator of

> Median Gross Rent is a statistically significant indicator of

> No Variables held statistical significance in indicating