

Bridging Gaps: Investigating COVID-19's Influence on Health Disparities in Connecticut

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Abstract

Social determinants of health (SDoH) are the conditions in which people are born, grow, live, work, and age, significantly influencing their overall health and well-being. These determinants include socioeconomic status, education, access to healthcare, and the physical environment. Understanding the interactions of these elements will be essential for addressing health disparities and developing more effective public health policies and interventions.

1 Introduction

Current research focuses on how social determinants of health (SDoH) plays a massive impact on one's health; it is estimated that 80 percent of a population's health outcomes are dictated by SDoH ([Hood et al., 2016](#)). Often, SDoH, when referring to an individual, can result in racial disparities in care when looking at a population([Monroe et al., 2023](#)). It has been shown that major inefficiencies in the health system are attributed to overlooked prevention opportunities and unequal access to care.([Allin et al., 2014](#))

Understanding the intricate interplay of these social determinants is crucial in addressing health disparities and developing effective public health policies and interventions. The COVID-19 pandemic has shed new light on these disparities, amplifying existing inequalities within various communities. This research topic gains paramount importance in the current context as it seeks to delve into the specific impact of COVID-19 on key social determinants of health in different counties and racial groups in Connecticut.

The existing literature underscores the pressing need for research in this area. Studies have shown that predominantly black counties in the United States experience significantly higher COVID-19 infection and mortality rates, emphasizing the racial disparities prevalent in healthcare outcomes. The pandemic has magnified these discrepancies, leading to mortality rates among historically marginalized minority communities that are 1.9 to 2.4 times higher compared to the general population ([Badalov et al., 2022](#)). Additionally, inefficiencies in the healthcare system have been attributed to overlooked prevention opportunities and unequal access to care, necessitating a comprehensive examination of these social determinants in the context of the pandemic.

Despite the growing body of research on SDoH, there is a notable gap concerning the specific impact of COVID-19 on these determinants within diverse communities. This research aims to bridge this gap by comprehensively assessing how the pandemic has influenced key social determinants of health across various counties and racial groups in Connecticut. By identifying the specific ways in which different communities were affected, this study contributes valuable insights for targeted interventions, policy-making, and the development of equitable healthcare strategies.

The rest of the paper is organized as follows.

- The data will be presented in [Section 2](#)
- The methods are described in [Section 3](#)
- The results are reported in [Section 4](#)
- A discussion concludes in [Section 5](#)

2 Data

Data was collected from The Agency for Healthcare Research and Quality (AHRQ). The dataset comprises 7 variables spanning a period of 4 years (2017, 2018, 2019, 2020) with observations across the 8 counties (Fairfield County, Hartford County, Litchfield County, Middlesex County, New Haven County, New London County, Tolland County, Windham County) in Connecticut. These variables encompass a total of 56 observations. The variables questions include housing, education level, income, insurance, rehospitalization rates, food stamps usage, and population racial characteristics. The dataset includes a range of calculated percentages, median values, and raw observations, providing a holistic view of various factors affecting the communities in these counties.

3 Methods

In this study, descriptive statistics is utilized to outline the total population, racial composition, education levels, and average rehospitalization rate across the 8 counties in Connecticut. Chi-squared analyses were conducted to assess the significance of the difference of the variables of median income, poverty level, health insurance, utilities access, and electronics access between counties and across the four years. Additional Tukey's HSD tests were conducted to determine the specific counties and years that have had significant differences within each of the variables for each county.

4 Results

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Table 1: Demographics and Education Levels for Counties 1-4

Category	Fairfield County	Hartford County	Litchfield County	Middlesex County
Total Population	944,977	894,465.25	182,657.5	163,318.25
Race (Percent)				
American Indian and Alaska Native	0.24	0.3075	0.2025	0.195
Asian	5.2925	5.2925	1.9	3.0625
Black or African American	11.405	13.7025	1.83	5.385
Native Hawaiian and Pacific Islander	0.055	0.035	0	0.005
White	72.6325	70.67	92.6025	88.0875
Ethnicity (Percent)				
Hispanic	19.53	17.8275	6.15	6.12

Table 2: Demographics and Education Levels for Counties 5-8

Category	New Haven County	New London County	Tolland County	Windham County
Total Population	858,678	268,477.75	151,218.75	116,608.75
Race (Percent)				
American Indian and Alaska Native	0.1725	0.605	0.05	0.565
Asian	4.005	4.12	4.675	1.3675
Black or African American	13.34	5.8175	3.1075	2.33
Native Hawaiian and Pacific Islander	0.0225	0.025	0	0.015
White	73.2875	80.6175	88.025	88.8725
Ethnicity (Percent)				
Hispanic	17.885	10.5	5.4475	11.6375

5 Discussion

The results of the analysis shed light on the intricate relationships between county, race, and key variables such as median income, housing affordability, rehospitalization rates, food stamps usage, uninsured rates, and racial demographics. Understanding these correlations is vital in comprehending the socio-economic and racial disparities prevalent in the studied region.

The disparity in median income over the studied years, particularly the peak observed in 2020, signifies economic fluctuations. Notably, county 1 stands out with significantly higher income compared to other counties, indicating potential disparities in resource access and opportunities. This wealth gap implies potential repercussions on community health outcomes. The consistent trend in the percentage of income spent on rent underscores

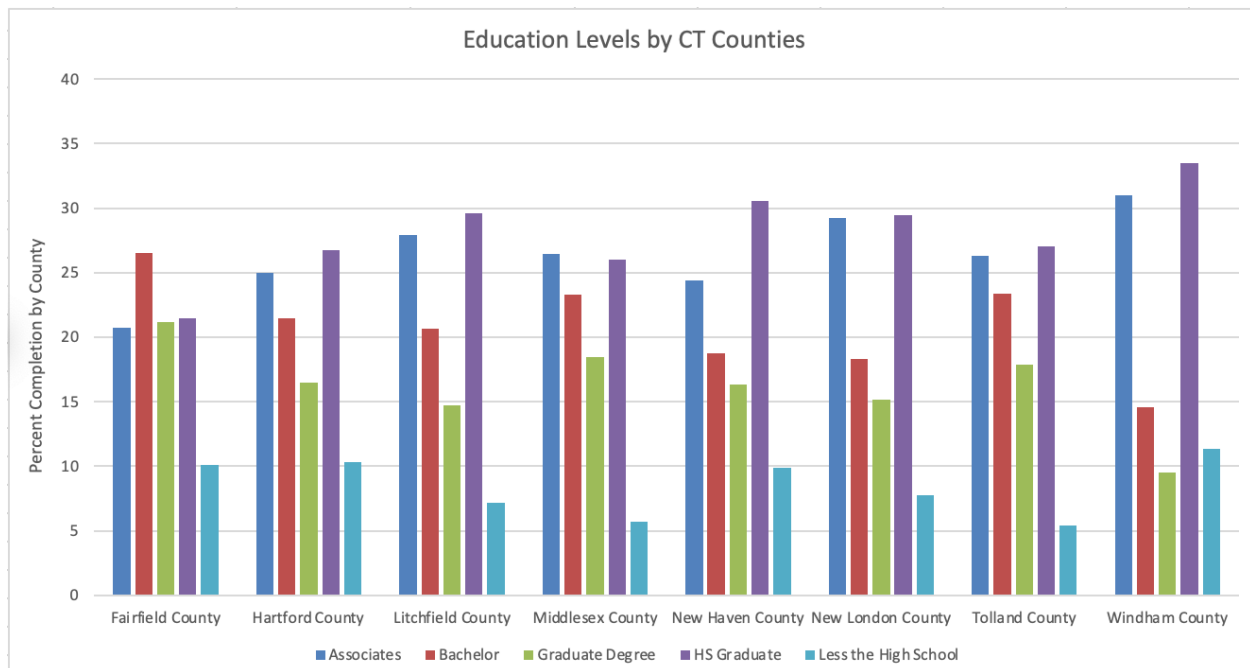


Figure 1: Education Levels by County.

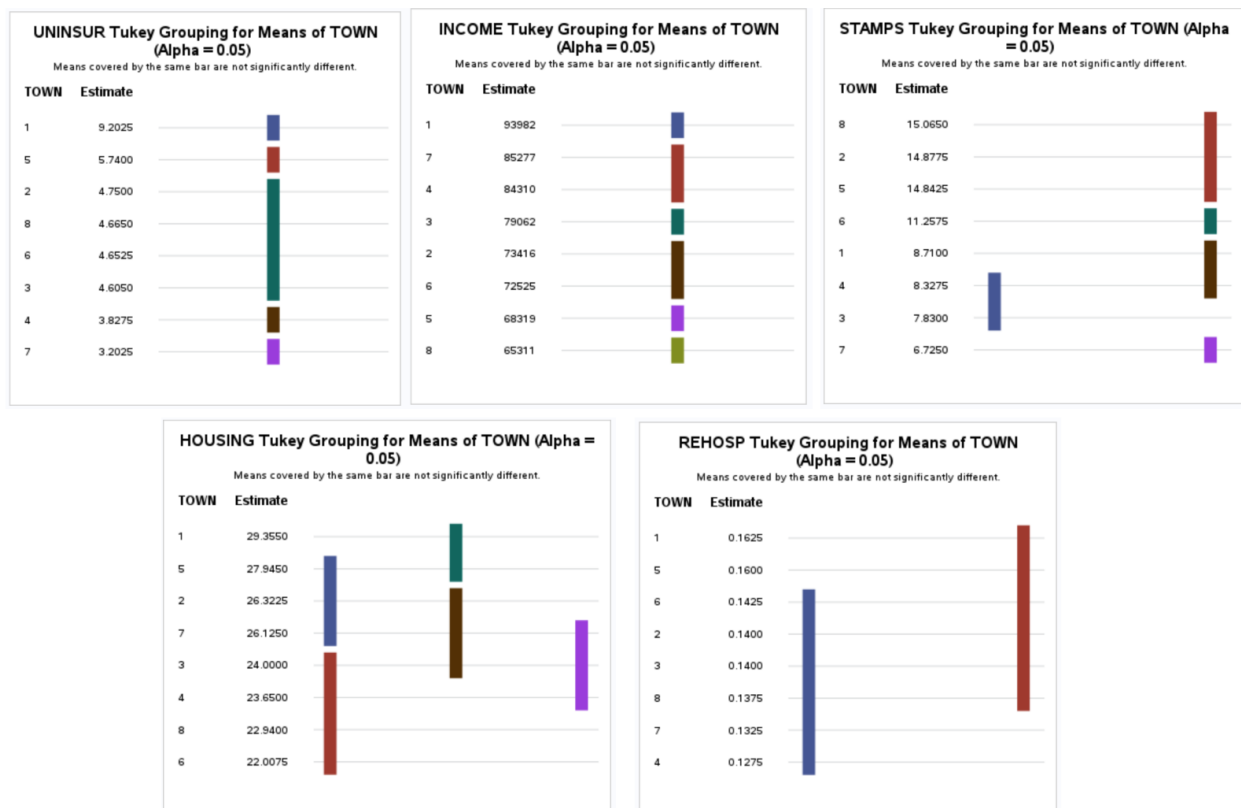


Figure 2: Social Needs Multiple Comparisons by County.

Table 3: Median Income Multiple Comparison by County

County 1(I)	County 2(J)	Mean Difference(I-J)	Std. Error	Sig.	95% Confidence	
					Lower Bound	Upper Bound
Fairfield County	Hartford County	20565.50*	1883.47	<0.001	14327.60	26803.40
	Litchfield County	14919.50*	1883.47	<0.001	8681.60	21157.40
	Middlesex County	9671.75*	1883.47	.001	3433.85	15909.65
	New Haven County	25662.75*	1883.47	.001	19424.85	31900.65
	New London County	21456.50*	1883.47	.001	15218.60	27694.40
	Tolland County	8705.00*	1883.47	0.002	2467.10	14942.90
	Windham County	28671.00*	1883.47	.001	22433.10	34908.90
Hartford County	Fairfield County	-20565.50*	1883.47	.001	-26803.40	-14327.60
	Litchfield County	-5646	1883.47	0.096	-11883.90	591.90
	Middlesex County	-10893.75*	1883.47	.001	-17131.65	-4655.85
	New Haven County	5097.25	1883.47	0.169	-1140.65	11335.15
	New London County	891	1883.47	1	-5346.90	7128.90
	Tolland County	-11860.50*	1883.47	.001	-18098.40	-5622.60
	Windham County	8105.50*	1883.47	0.005	1867.60	14343.40
Litchfield County	Fairfield County	-14919.50*	1883.47	.001	-21157.40	-8681.60
	Hartford County	5646	1883.47	0.096	-591.90	11883.90
	Middlesex County	-5247.75	1883.47	0.145	-11485.65	990.15
	New Haven County	10743.25*	1883.47	.001	4505.35	16981.15
	New London County	6537	1883.47	0.035	299.10	12774.90
	Tolland County	-6214.5	1883.47	0.051	-12452.40	23.40
	Windham County	13751.50*	1883.47	.001	7513.60	19989.40
Middlesex County	Fairfield County	-9671.75*	1883.47	.001	-15909.65	-3433.85
	Hartford County	10893.75*	1883.47	.001	4655.85	17131.65
	Litchfield County	5247.75	1883.47	0.145	-990.15	11485.65
	New Haven County	15991.00*	1883.47	.001	9753.10	22228.90
	New London County	11784.75*	1883.47	.001	5546.85	18022.65
	Tolland County	-966.75	1883.47	0.999	-7204.65	5271.15
	Windham County	18999.25*	1883.47	.001	12761.35	25237.15
New Haven County	Fairfield County	-25662.75*	1883.47	.001	-31900.65	-19424.85
	Hartford County	-5097.25	1883.47	0.169	-11335.15	1140.65
	Litchfield County	-10743.25*	1883.47	.001	-16981.15	-4505.35
	Middlesex County	-15991.00*	1883.47	.001	-22228.90	-9753.10
	New London County	-4206.25	1883.47	0.368	-10444.15	2031.65
	Tolland County	-16957.75*	1883.47	.001	-23195.65	-10719.85
	Windham County	3008.25	1883.47	0.747	-3229.65	9246
New London County	Fairfield County	-21456.50*	1883.47	.001	-27694.40	-15218.60
	Hartford County	-891	1883.47	1	-7128.90	5346.90
	Litchfield County	-6537.00*	1883.47	0.035	-12774.90	-299.10
	Middlesex County	-11784.75*	1883.47	.001	-18022.65	-5546.85
	New Haven County	4206.25	1883.47	0.368	-2031.65	10444.15
	Tolland County	-12751.50*	1883.47	.001	-18989.40	-6513.60
	Windham County	7214.50*	1883.47	0.016	976.60	13452.40
Tolland County	Fairfield County	-8705.00*	1883.47	0.002	-14942.90	-2467.10
	Hartford County	11860.50*	1883.47	.001	5622.60	18098.40
	Litchfield County	6214.50	1883.47	0.051	-23.40	12452.40
	Middlesex County	966.75	1883.47	0.999	-5271.15	7204.65
	New Haven County	16957.75*	1883.47	.001	10719.85	23195.65
	New London County	12751.50*	1883.47	.001	6513.60	18989.40
	Windham County	19966.00*	1883.47	.001	13728.10	26203.90
Windham County	Fairfield County	-28671.00*	1883.47	.001	-34908.90	-22433.10
	Hartford County	-8105.50*	1883.47	0.005	-14343.40	-1867.60
	Litchfield County	-13751.50*	1883.47	.001	-19989.40	-7513.60
	Middlesex County	-18999.25*	1883.47	.001	-25237.15	-12761.35
	New Haven County	-3008.25	1883.47	0.747	-9246.15	3229.65
	New London County	-7214.50*	1883.47	0.016	-13452.40	-976.60
	Tolland County	-19966.00*	1883.47	.001	-26203.90	-13728.10

Table 4: Multiple Comparisons by Year and Town

Social Need	Comparison by	DF	Sum of Squares	Mean Square	F Value	P Value
Median Income	Year	3	158657606	52885869	95.57	0.0001
	Town	7	2618521106	374074444	675.99	0.0001
Food	Year	3	3.6450625	1.2150208	10.08	0.0003
	Town	7	348.3382875	49.7626125	412.72	0.0001
Housing	Year	3	1.4535125	0.4845042	0.41	0.7506
	Town	7	183.9498375	26.2785482	21.99	0.0001
Rehospitalization Rate	Year	3	0.00050938	0.00016979	1.45	0.2578
	Town	7	0.00427188	0.00061027	5.2	0.0015
Uninsured Rate	Year	3	2.6848375	0.89494583	17.17	0.0001
	Town	7	92.8554875	13.26506964	254.57	0.0001

a persistent challenge for residents, especially noticeable in counties 1 and 5, indicating enduring economic pressure.

The results pertaining to housing defined by renters whose rent is 50 percent of their income, reveal noteworthy patterns with respect to social needs. Examining the data across the four-year span indicates a consistent trend, as no significant differences were observed. However, significant differences are revealed when comparing between counties. Counties 1 and 5 exhibited a statistically significant increase in the percentage of renters facing housing costs amounting to 50 percent of their income compared to counties 2, 7, and 3. Intriguingly, there was no statistically significant distinction between counties 1 and 5, suggesting a commonality in the challenges faced by renters in these specific regions. These findings underscore the importance of localized interventions and policy considerations to address the distinct socio-economic dynamics influencing housing affordability across different counties.

Food access was assessed through investigating the proportion of the population involved in the use of Food Stamps programs. AHRQ data reveals notable variations across different counties. Counties 8, 2, and 5 exhibit a statistically significant higher percentage of the population relying on Food Stamps, suggesting a potentially elevated level of economic vulnerability or socio-economic challenges in these areas. County 6 also demonstrates a substantial proportion of its population on Food Stamps, indicating a notable need for social assistance. Conversely, County 7 stands out with the lowest percentage of its population depending on Food Stamps, implying comparatively better economic conditions or potentially

more effective social support systems. These findings underscore the importance of targeted interventions and resource allocation to address social needs, particularly in counties with higher reliance on Food Stamps. Further exploration into the underlying factors contributing to these variations is needed for informed policy development and community-specific interventions.

Rehospitalization rates demonstrate stability across counties and years leading up to 2020, suggesting a consistent healthcare landscape. Counties 8, 2, and 5 exhibiting higher food stamp usage point to economic challenges faced by residents in these regions. This trend aligns with housing affordability issues, indicating a correlation between financial stress and reliance on government assistance programs.

The notably high uninsured rate in county 1 raises concerns about healthcare accessibility, likely linked to economic factors impacting insurance affordability. Conversely, the lower uninsured rate in Year 3 (2019) signifies positive progress. Analyzing the policies or interventions implemented during this period could provide valuable insights for effective healthcare reforms, offering potential guidance for future initiatives.

The racial demographics highlight disparities in various counties. County 3's higher percentage of white individuals, coupled with County 2, 5, and 1 having the highest black population, points to the need for targeted interventions addressing racial health inequalities. These disparities might be indicative of historical, social, and economic factors influencing the healthcare experiences of different racial groups.

5.1 Limitations

One limitation lies in the availability and quality of data. This dataset does not have any data from years after 2020 which may serve to limit potential external validity considerations. There may also be variability in data collection methods and discrepancies in reporting standards leading to missing or incomplete data over the course of 4 years. Another limitation involves the scope of the study, focusing on specific counties in Connecticut may not fully

capture nationwide disparities. Additionally, the research is limited to the factor parameters selected to investigate which might not encompass all relevant social determinants affecting health outcomes.

5.2 Future Directions

These findings underscore the complex interplay between socio-economic status, race, and health outcomes. Addressing these disparities requires multifaceted interventions, including economic support, affordable housing initiatives, and targeted healthcare access programs. Future research should delve deeper into the root causes of these disparities, considering historical and systemic factors. Additionally, policy interventions and community-based programs should be designed to specifically target areas and populations facing the most significant challenges, aiming for a more equitable healthcare landscape for all residents.

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