Antimicrobial Stewardship & Healthcare Epidemiology (2025), **5**, e275, 1–3
doi:10.1017/ash.2025.10193

SHEA

Concise Communication

Paxlovid utilization and social vulnerability: trends in Connecticut from 2022 to 2023

Laura Hohenstein BS[1], Meghan Maloney MPH[2] and David B. Banach MD, MPH, MS[1]

[1]University of Connecticut School of Medicine, Farmington, CT, USA and [2]Connecticut Department of Public Health, Hartford, CT, USA

Abstract

The COVID-19 pandemic disproportionately affected vulnerable communities. Social vulnerability index (SVI) for census tracts with a Paxlovid dispensing site was higher than those without a dispensing site (0.56 vs. 0.45, $P < .01$). Paxlovid utilization was lower in high-SVI tracts. Pandemic preparedness planning should address equitable access to anti-infective therapies.

(Received 24 May 2025; accepted 18 September 2025)

Introduction

Nirmatrelvir-ritonavir (Paxlovid) is the most widely used oral antiviral for COVID-19. It became available after an emergency use authorization (EUA) released by the Food and Drug Administration in 2021 and remains the first-line treatment for children and adults at high risk of progressing to severe COVID-19. Nirmatrelvir-ritonavir is nearly 90% effective at preventing severe disease, hospitalization, and death.[1]

Disparities in COVID-19-associated morbidity and mortality are well studied, as the COVID-19 pandemic highlighted existing inequities in healthcare.[2] A 2021 meta-analysis found that racial and ethnic minority groups in the United States (U.S.) were at greater risk of COVID-19-associated hospitalization and mortality than their white counterparts. Other risk factors included low level of education, poverty, and low household income.[3] Other studies have shown that these sociodemographic inequities extend to antiviral treatment for COVID-19.[4] Black patients in the U.S. were 35.8% less likely than white patients to be prescribed nirmatrelvir-ritonavir in the outpatient setting, and Hispanic patients were 29.9% less likely than non-Hispanic patients.[4] Social vulnerability, defined as demographic and socioeconomic forces that inform a response to population-level stress, was also associated with lower antiviral prescription rates.[5] Factors contributing to racial and socioeconomic disparities in COVID-19 treatment might include access to healthcare and therapeutics and negative associations with the healthcare system amongst historically disadvantaged groups that discourage care seeking.[6]

Although prior studies have examined equity in nirmatrelvir-ritonavir prescription, no such study has been conducted in Connecticut, which had the 11th highest rate of nirmatrelvir-ritonavir prescriptions in the U.S in 2022.[7] Connecticut's weekly COVID-19 case rate during the study period (March 2022–February 2023) ranged from 50 to 129 per 100,000 population, and the weekly death rate ranged from .6 to 1.4 per 100,000 population.[8,9] Assessment of nirmatrelvir-ritonavir distribution as it relates to social vulnerability in Connecticut could inform future equitable public health initiatives.

Methods

We conducted a retrospective, ecological analysis of associations between sociodemographic census tract characteristics, particularly social vulnerability, and nirmatrelvir-ritonavir utilization in Connecticut census tracts from March 2022 through February 2023.

Census tract characteristics

The social vulnerability index (SVI), developed by the U.S. Centers for Disease Control and Prevention (CDC), that incorporates socioeconomic factors including poverty, unemployment, and health insurance coverage, as well as household characteristics, racial and ethnic minority status, and access to transportation.[10] SVI ranges from 0 to 1 where higher values represent greater social vulnerability. Data from the 2020 SVI was categorized into quartiles (low, low-medium, medium-high, and high). Additional socioeconomic measures of interest from the SVI database included percentage of population over age 65, of minority race/ethnicity, speaking limited English, and living below 150% of the poverty limit. COVID-19 case rate and vaccination rate were calculated per population in each census tract. This data was obtained through Connecticut Department of Public Health (CT DPH).

Nirmatrelvir-ritonavir utilization rate

Nirmatrelvir-ritonavir utilization rates were obtained from CT DPH and calculated as the number of courses dispensed by outpatient sites (including pharmacies, urgent care centers, and primary care offices) within each census tract divided by

Corresponding author: David B. Banach; Email: dbanach@uchc.edu

Cite this article: Hohenstein L, Maloney M, Banach DB. Paxlovid utilization and social vulnerability: trends in Connecticut from 2022 to 2023. *Antimicrob Steward Healthc Epidemiol* 2025. doi: 10.1017/ash.2025.10193

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Table 1. Demographic and COVID-19 characteristics of census tracts with and without a nirmatrelvir-ritonavir dispensing site

	Tracts with a dispensing site (n = 367)	Tracts without a dispensing site (n = 506)	p value
Average SVI Quartile (Value, 0 – 1)	Medium-High (0.56)	Low-Medium (0.45)	< .001
Population density (persons per square mile)	4 008	4 036	.958
% Aged over 65	17.53	17.28	.068
% Minority	37.15	33.74	.607
% Speaking Limited English	4.12	3.58	.130
% Under 150% Poverty	18.28	16.36	.064
% Fully Vaccinated	72.51	72.39	.893
Case Rate Mar—Sep 2022 (per 1 000)	42.72	41.88	.272
Case Rate Feb 2022—Mar 2023 (per 1 000)	28.30	27.62	.066

population. Long-term care facilities were excluded as they are dispensed from centralized pharmacies not correlated with patient residence. Population denominators were based on 2020 census data reported in the SVI database.

Analyses

We first identified census tracts with at least one outpatient dispensing site during the study period. We compared SVI, population density, sociodemographic characteristics, and COVID-19 infection and vaccination rates for census tracts with at least one dispensing site to tracts with no dispensing sites using independent T-tests and ANOVA. For census tracts with at least one dispensing site, ANOVA with post hoc Tukey HSD tests was used to test associations between SVI quartile and nirmatrelvir-ritonavir utilization rate. Analyses were performed in R version 4.3.1 statistical software. This study was approved by the CT DPH Human Investigations Committee.

Results

Of 873 Connecticut census tracts, 367 had a dispensing site. SVI for census tracts with a dispensing site (mean 0.56) was higher than those without a dispensing site (mean 0.45) ($P < .01$). There was not a statistically significant difference in other characteristics between tracts with and without a dispensing site (Table 1).

ANOVA revealed a statistically significant difference in nirmatrelvir-ritonavir utilization rates between SVI quartiles ($F(3, 363) = 9.5$, $P = .002$). Nirmatrelvir-ritonavir utilization rates per 1 000 people were higher in census tracts with "low-medium" SVI (46.62, $P = .012$) and "medium-high" SVI (48.75, $P = .002$) quartiles compared to the "high" SVI (28.02) quartile, while other quartile comparisons did not exhibit statistically significant differences (Table 2).

When SVI is disaggregated by socio-demographics, dispensation rates were lower in tracts with the highest percentages of minority populations, those speaking limited English, and individuals below 150% of the poverty line, particularly in the highest SVI quartile (Table 2).

Discussion

This study describes the relationship between social vulnerability and nirmatrelvir-ritonavir dispensing in Connecticut census tracts during the COVID-19 pandemic. Census tracts with high social vulnerability were less likely to have a dispensing site and had lower nirmatrelvir-ritonavir dispensing rates per 1,000 population. This pattern is consistent with prior studies documenting structural barriers to healthcare for vulnerable populations, as well as national-level analyses of the COVID-19 pandemic specifically.[4,6,7] The association of lower dispensing rates with census tracts characterized by higher social vulnerability may reflect reduced access to healthcare resources or systemic inequities in care delivery. Even though cost was not a factor during the study period, barriers related to structural mistrust, ability to navigate the healthcare system, and communication with providers may have disproportionately affected these populations.[5,8]

The results described are subject to limitation. The relationship between the nirmatrelvir-ritonavir dispensing site and an individual's residence may not always be consistent, as some individuals may use pharmacies located outside their local community. Further, while the data reflects whether a tract has at least one dispensing site, there is no information on the density of dispensing sites in those tracts with more than one site, which may affect prescription access. Another potential limitation is variability in home testing rates over time. Case rates include only positive tests that were reported through inpatient and outpatient testing. Home testing is not routinely reported, and those that test positive without symptoms do not qualify for antiviral treatment. Finally, this is a population-level analysis and further research is needed to better characterize factors that impact individuals' access to nirmatrelvir-ritonavir.

Table 2. Key socioeconomic characteristics and differences in nirmatrelvir-ritonavir dispensing rates between SVI quartile groups from March 2022 – February 2023

SVI quartile	Dispensing rate per 1 000	% Aged over 65	% Minority	% Speaking limited English	% Under 150% poverty	Reference SVI quartile (rate per 1 000)	Difference	p value for difference in dispensing rate
Low	38.13	18.19	13.85	0.59	5.31	High (28.02)	10.11	.193
Low-Medum	46.62	19.59	20.94	1.36	9.58	High (28.02)	18.6	.012
Medium-High	48.75	18.36	34.96	3.22	16.47	High (28.02)	20.73	.002
Low-Medium	46.62	–	–	–	–	Low (38.13)	8.49	.951
Medium-High	48.75	–	–	–	–	Low (38.13)	10.62	.853
Medium-High	48.75	–	–	–	–	Low-Medium (46.62)	2.13	.990
High	28.02	14.3	66.05	9.48	34.8	–		–

https://doi.org/10.1017/ash.2025.10193 Published online by Cambridge University Press

Of note, there was no cost to patients for nirmatrelvir-ritonavir during this period, which may mitigate disparities caused by patients' ability to afford their prescriptions. However, federal purchase and distribution programs ended with the transition to full FDA approval in May 2023. This change may exacerbate disparities in access, particularly among vulnerable populations who previously benefited from free antiviral treatment.

Equitable access to COVID-19 antivirals remains a public health priority for the U.S. government and Connecticut DPH. Knowledge gained from this project will be useful for impacting equitable distribution of nirmatrelvir-ritonavir and other oral antivirals. Improved outpatient treatment of COVID-19 has the potential to reduce hospitalizations and strain on the healthcare system. Moreover, these associations may be relevant to establishing frameworks for emergency distribution of therapeutics in the setting of future public health emergencies.

Acknowledgements. None.

Financial support. None.

competing interests. The authors report no conflicts of interest relevant to this article.

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