Disparities in COVID-19 Vaccination Uptake by Social Vulnerability Index: A US nationwide study

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INTRODUCTION

• Several studies show that socially vulnerable communities have been disproportionally impacted during the early phase of the COVID-19 pandemic, on a global scale [1-8].

• Impacts on these socially vulnerable communities include increased risk for SARS-CoV-2 infection, heightened burden of COVID-19 related adverse health outcomes, and limited access to healthcare, including COVID-19 testing, vaccination and treatment [1-8].

OBJECTIVE

• This study examined and characterized differences in COVID-19 vaccination uptake by social vulnerability status during Omicron variant predominance among adults in the US.

METHODS

• Symptomatic US adults testing positive for SARS-CoV-2 at CVS Health and reporting at least 1 symptom were recruited between 03/02-05/18/2023 (CT.gov: NCT05160636).

• Socio-demographics, clinical characteristics and COVID-19 vaccination status were self-reported by patients via an online questionnaire completed upon registration for SARS-CoV-2 testing at a CVS Health test site.

• Vaccination status was measured via self-report and classified as up-to-date (receipt of BNT162b2 bivalent adapted vaccine) or not up-to-date (no bivalent or unvaccinated). Individuals receiving vaccines other than BNT162b2 were excluded

• Individuals were categorized based on the Social Vulnerability Index (SVI), a composite score developed by the CDC [9-10], with the quartile 4 representing the highest vulnerability and quartile 1 representing the lowest vulnerability [9-10].

• Logistic regression models [11] estimated odds ratios (OR) for vaccine uptake by SVI, adjusting for age, gender, region, race and ethnicity.

RESULTS

• Among 640 consented participants, the SVI distribution was 156 (24%) quartile 1, 238 (37%) quartile 2, 159 (25%) quartile 3, and 87 (14%) quartile 4. Their mean SVI scores were, respectively, 0.16, 0.38, 0.61, and 0.84 (p<0.001). (**Table 1**).

• Age, race, and geographic distribution differed significantly across the quartiles: relative to quartile 1, the quartile 4 participants were younger (mean age: 43.4 vs 50.4; p= 0.0004), had the highest representation of Black or Hispanic (57.5% vs 12.2%; p<0.001), and from Southern or Western US states (82.7% vs 50.0%; p<0.001) (**Table 1**).

• COVID-19 BNT162b2 bivalent vaccination uptake was significantly lower in the most socially vulnerable groups: 37.9% in quartile 4, 35.8% in quartile 3, 50.8% in quartile 2, and 65.4% in quartile 1 (p<0.001).

• Relative to quartile 1, both quartile 4 and quartile 3 participants had significantly lower adjusted odds of being up-to-date with COVID-19 vaccination: 0.49 [95% confidence interval (CI) 0.27-0.90] and 0.34 (95% 0.21-0.56), respectively.

Table 1. Patient Characteristics and COVID-19 Vaccination

	Quartile 1 (least vulnerable)	Quartile 2	Quartile 3	Quartile 4 (most vulnerable)	P-value**
Total n					
Age, years, mean (SD)	50.4 (14.9)	45.9 (16.7)	44.7 (15.4)	43.4 (14.7)	0.001
Gender, % (n)					0.203
Male, % (n)	100 (64.1%)	174 (73.1%)	112 (70.4%)	65 (74.7%)	
Female, % (n)	56 (35.9%)	62 (26.1%)	44 (27.7%)	21 (24.1%)	
Unknown, % (n)	0 (0.0%)	2 (0.8%)	3 (1.9%)	1 (1.2%)	
Race / Ethnicity					<0.001
White or Caucasian	112 (71.8%)	158 (66.4%)	78 (49.1%)	23 (26.4%)	
Black or African American	9 (5.8%)	16 (6.7%)	18 (11.3%)	14 (16.1%)	
Hispanic	10 (6.4%)	23 (9.7%)	30 (18.9%)	36 (41.4%)	
Other	25 (16.1%)	41 (17.2%)	33 (20.7%)	14 (16.1%)	
US Geographic Region					<0.001
Northeast	40 (25.6%)	32 (13.4%)	8 (5.0%)	6 (6.9%)	
South	44 (28.2%)	106 (44.5%)	69 (43.4%)	41 (47.1%)	
Midwest	38 (24.4%)	59 (24.8%)	35 (22.0%)	9 (10.3%)	
West	34 (21.8%)	41 (17.2%)	47 (29.6%)	31 (35.6%)	
Social Vulnerability Index, mean (SD)	0.16 (0.06)	0.38 (0.08)	0.61 (0.07)	0.84 (0.06)	<0.001
≥1 comorbid condition*	36 (23.1%)	61 (25.6%)	38 (23.9%)	28 (32.2%)	0.432
Prior positive test	63 (43.4%)	91 (40.6%)	73 (49.0%)	41 (48.2%)	0.373
Vaccination Status					<0.001
Up-to-date (BNT162b2 Bivalent)	102 (65.4%)	121 (50.8%)	57 (35.8%)	33 (37.9%)	
Unvaccinated or not up-to-date	54 (34.6%)	117 (49.2%)	102 (64.2%)	54 (62.1%)	
Time since BNT162b2 bivalent dose, days, mean (SD)	167 (42)	172 (44)	150 (53)	162 (46)	0.021

• Comorbid conditions include asthma or chronic lung disease, cirrhosis of the liver, immunocompromised conditions or weakened immune system, diabetes, heart conditions or hypertension, overweight or obesity, smoking. Bivalent (Original/Omicron BA.4/5) COVID-19 vaccine is no longer authorized in the US.
• **P-Value of ANOVA for continuous variables, and chi-square tests for categorical variables or Fisher's exact tests when any one cell has an expected frequency less than 5.

CONCLUSIONS

• **This study provides evidence of disparities in uptake of COVID-19 vaccination during a period of predominance of the Omicron variant.**

• **Compared with quartile 1, the most vulnerable groups (quartiles 4 and quartile 3) had 51-66% lower odds of being up-to-date with COVID-19 vaccination.**

• **Key limitations of this study include self-reported data and limited sample size for analysis**

• **These findings highlight the need to improve access and acceptance of COVID-19 vaccination, particularly among the most socially vulnerable.**

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