

## Supplemental Online Content

Karpman M, Zuckerman S, Morriss S. Health care access and affordability among US adults aged 18 to 64 years with self-reported post–COVID-19 condition. *JAMA Netw Open*. 2023;6(4):e237455. doi:10.1001/jamanetworkopen.2023.7455

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This supplemental material has been provided by the authors to give readers additional information about their work.

**eTable 1.** Demographic and Geographic Characteristics of Health Reform Monitoring Survey Respondents and Nonrespondents

Characteristic	Respondents (%) <sup>a</sup> (N=9484)	Nonrespondents (%) <sup>a</sup> (N=9678) <sup>b</sup>	P value <sup>c</sup>
Sex			
Female	49.8	56.9	<.001
Male	50.2	43.1	<.001
Age, y			
18-49	57.9	71.2	<.001
50-64	42.1	28.8	<.001
Race and ethnicity			
Asian	3.8	3.1	0.01
Black	12.0	15.5	<.001
Hispanic	18.7	27.4	<.001
White	60.6	49.2	<.001
Other <sup>d</sup>	5.0	4.8	0.60
Educational attainment			
High school degree or less	31.4	35.3	<.001
Some college	30.1	35.5	<.001
Bachelor's degree or more	38.5	29.1	<.001
Residence in a rural area <sup>e</sup>	14.1	14.2	0.78

<sup>a</sup> Sample sizes and percentage estimates are unweighted. Percentage estimates are rounded.

<sup>b</sup> Nonrespondents include 9563 individuals who did not take the survey, 105 individuals who were excluded because of high levels of item nonresponse, and 10 individuals who were excluded from analysis because they did not answer questions on diagnosed COVID-19 or post-COVID-19 condition.

<sup>c</sup> P values were estimated using independent sample *t* tests of the differences between respondents and nonrespondents.

<sup>d</sup> Other race and ethnicity includes adults who did not identify as Hispanic and who identified as American Indian or Alaska Native, Native Hawaiian or other Pacific Islander, more than one race, or some other race.

<sup>e</sup> Adults who lived in a rural area include those who did not live in a metropolitan statistical area.

**eTable 2.** Logistic Regression Models Estimating Association of Post–COVID-19 Condition With Unmet Needs for Health Care in Past 12 Months Because of Costs

	(1)		(2)		(3)				
	coefficient (log odds)	standard error	coefficient (log odds)	standard error	coefficient (log odds)	standard error			
Reported current Long COVID (ref.)									
Ever diagnosed with COVID-19 but without Long COVID	-0.545	0.084	*	-0.544	0.085	*	-0.564	0.085	*
Never diagnosed with COVID-19	-0.602	0.075	*	-0.608	0.079	*	-0.620	0.083	*
Female sex	0.340	0.054	*	0.282	0.053	*	0.275	0.057	*
Male (ref.)									
Age 18-34	0.361	0.094	*	0.304	0.094	*	0.293	0.094	*
Age 35-49	0.260	0.068	*	0.278	0.067	*	0.288	0.067	*
Age 50-64 (ref.)									
Asian	-0.705	0.305	*	-0.696	0.290	*	-0.582	0.250	*
Black	0.027	0.087		-0.070	0.083		-0.107	0.082	
Hispanic	0.191	0.097		0.073	0.103		0.122	0.112	
White (ref.)									
Other race or ethnicity <sup>a</sup>	0.233	0.142		0.139	0.138		0.169	0.147	
High school degree or less	0.261	0.088	*	-0.019	0.093		-0.024	0.089	
Some college	0.348	0.091	*	0.136	0.091		0.128	0.094	
Bachelor's degree or more (ref.)									
Citizen	0.051	0.146		0.096	0.139		0.065	0.159	
Not a citizen (ref.)									
Married	-0.207	0.056	*	-0.069	0.067		-0.062	0.063	
Not married (ref.)									
Lives with dependent children under 19	0.256	0.061	*	0.118	0.061		0.087	0.060	
Does not live with dependent children under 19 (ref.)									
Ever diagnosed with hypertension	0.209	0.092	*	0.184	0.089	*	0.167	0.089	
Ever diagnosed with hyperlipidemia	0.179	0.114		0.179	0.114		0.193	0.117	
Ever diagnosed with coronary heart disease, angina, heart attack, or other heart condition	0.432	0.160	*	0.401	0.158	*	0.388	0.155	*
Ever diagnosed with stroke	0.142	0.195		0.135	0.192		0.129	0.187	
Ever diagnosed with cancer	0.121	0.163		0.154	0.166		0.170	0.174	
Ever diagnosed with diabetes	0.245	0.080	*	0.207	0.077	*	0.210	0.075	*
Ever diagnosed with asthma	0.316	0.086	*	0.318	0.084	*	0.341	0.081	*
Ever diagnosed with COPD, emphysema, or chronic bronchitis	0.270	0.181		0.236	0.172		0.185	0.168	

Ever diagnosed with arthritis, gout, lupus, or fibromyalgia	0.469	0.088	*	0.432	0.088	*	0.421	0.090	*
Diagnosed with multiple physical health conditions	0.083	0.153		0.075	0.150		0.053	0.147	
Not diagnosed with physical health conditions (ref.)									
Insured all months of the year	-0.958	0.093	*	-1.361	0.144	*	-1.294	0.153	*
Insured some months but not every month	0.135	0.117		-0.204	0.136		-0.146	0.142	
Uninsured all months of the year (ref.)									
Lives in urban area (ref.)									
Lives in rural area <sup>b</sup>	0.069	0.106		-0.006	0.114		-0.040	0.123	
Employer-sponsored health insurance at time of survey (ref.)									
Public health insurance at time of survey				-0.333	0.128	*	-0.318	0.128	*
Private nongroup or unspecified type of health insurance at time of survey				0.009	0.103		-0.009	0.096	
Uninsured at time of survey				-0.672	0.165	*	-0.675	0.164	*
Family income less than or equal to 138% of federal poverty level (FPL)				1.100	0.112	*	1.100	0.111	*
Family income greater than 138% to 249% FPL				0.993	0.104	*	0.992	0.103	*
Family income greater than 250% to 399% FPL				0.800	0.099	*	0.781	0.100	*
Family income greater than or equal to 400% FPL (ref.)									
Lives in Northeast region (ref.)									
Lives in Midwest region							0.138	0.075	
Lives in South region							0.209	0.095	*
Lives in West region							-0.176	0.108	
Lowest quartile of population-to-primary care physician ratio (ref.) <sup>c</sup>									
Second quartile of population-to-primary care physician ratio							0.145	0.121	
Third quartile of population-to-primary care physician ratio							0.082	0.084	
Highest quartile of population-to-primary care physician ratio							0.078	0.121	
Constant	-1.181	0.219	*	-1.095	0.250	*	-1.254	0.254	*
Observations	9,484			9,484			9,422		

\* P<0.05

<sup>a</sup> Other race and ethnicity includes adults who do not identify as Hispanic and who identify as American Indian or Alaska Native, Native Hawaiian or Other Pacific Islander, more than one race, or some other race.

<sup>b</sup> Adults who live in a rural area include those who do not live in a metropolitan statistical area.

<sup>c</sup> Population-to-primary care physician ratio is based on data from the County Health Rankings<sup>1</sup> and originally derived from 2019 American Medical Association Physician Masterfile data included in the 2020-2021 Area Health Resources File. Estimates exclude 62 observations with missing data.

**eTable 3.** Estimated Probabilities of Health Care Access Outcomes

	(1) Main model		(2) With added controls for family income and health insurance coverage type		(3) With added controls for Census region and population-to-primary care physician ratio	
	predicted probability	standard error	predicted probability	standard error	predicted probability	standard error
<b>Has a usual place to get health care</b>						
Adults with current Long COVID	0.828	0.016	0.828	0.016	0.825	0.017
Adults ever diagnosed with COVID-19 but without Long COVID	0.835	0.011	0.835	0.011	0.835	0.011
Adults never diagnosed with COVID-19	0.803	0.010	0.803	0.010	0.803	0.010
<b>Did not get needed care in past 12 months for the following reasons:</b>						
<b>Costs</b>						
Adults with current Long COVID	0.270	0.019	0.268	0.020	0.268	0.021
Adults ever diagnosed with COVID-19 but without Long COVID	0.183	0.012	0.184	0.012	0.182	0.013
Adults never diagnosed with COVID-19	0.175	0.010	0.175	0.010	0.174	0.010
<b>Difficulty finding a provider accepting new patients</b>						
Adults with current Long COVID	0.164	0.010	0.164	0.010	0.164	0.010
Adults ever diagnosed with COVID-19 but without Long COVID	0.101	0.007	0.103	0.007	0.103	0.007
Adults never diagnosed with COVID-19	0.107	0.006	0.106	0.005	0.106	0.005
<b>Difficulty getting an appointment as soon as needed</b>						
Adults with current Long COVID	0.220	0.014	0.220	0.014	0.222	0.014
Adults ever diagnosed with COVID-19 but without Long COVID	0.144	0.006	0.146	0.006	0.146	0.006
Adults never diagnosed with COVID-19	0.139	0.005	0.138	0.005	0.137	0.005
<b>Difficulty getting to a doctor's office or clinic when it was open</b>						
Adults with current Long COVID	0.110	0.011	0.110	0.011	0.110	0.011
Adults ever diagnosed with COVID-19 but without Long COVID	0.053	0.004	0.054	0.004	0.054	0.004
Adults never diagnosed with COVID-19	0.067	0.002	0.067	0.002	0.067	0.002

**Difficulty getting a telehealth visit**

Adults with current Long COVID	0.076	0.011	0.077	0.011	0.078	0.012
Adults ever diagnosed with COVID-19 but without Long COVID	0.031	0.003	0.032	0.003	0.032	0.003
Adults never diagnosed with COVID-19	0.040	0.003	0.040	0.003	0.040	0.003

**Difficulty finding transportation**

Adults with current Long COVID	0.061	0.009	0.063	0.009	0.064	0.010
Adults ever diagnosed with COVID-19 but without Long COVID	0.035	0.004	0.038	0.004	0.038	0.004
Adults never diagnosed with COVID-19	0.051	0.004	0.049	0.004	0.049	0.004

**Difficulty getting health plan authorization for care or prescription drugs**

Adults with current Long COVID	0.166	0.010	0.166	0.010	0.166	0.010
Adults ever diagnosed with COVID-19 but without Long COVID	0.108	0.006	0.110	0.006	0.109	0.006
Adults never diagnosed with COVID-19	0.103	0.005	0.102	0.005	0.102	0.005

**Difficulty finding a doctor accepting coverage type**

Adults with current Long COVID	0.159	0.012	0.159	0.012	0.159	0.012
Adults ever diagnosed with COVID-19 but without Long COVID	0.096	0.006	0.100	0.006	0.099	0.006
Adults never diagnosed with COVID-19	0.100	0.005	0.098	0.005	0.098	0.005

**Difficulty getting information on network, covered services, or cost of care**

Adults with current Long COVID	0.136	0.013	0.137	0.013	0.139	0.013
Adults ever diagnosed with COVID-19 but without Long COVID	0.076	0.005	0.077	0.005	0.075	0.005
Adults never diagnosed with COVID-19	0.086	0.006	0.085	0.006	0.085	0.007

**Additional health care affordability problems:****Problems paying family medical bills in past 12 months**

Adults with current Long COVID	0.235	0.021	0.233	0.021	0.234	0.021
Adults ever diagnosed with COVID-19 but without Long COVID	0.159	0.012	0.160	0.012	0.158	0.013
Adults never diagnosed with COVID-19	0.147	0.010	0.147	0.010	0.146	0.010

**Currently has medical bills that are past due**

Adults with current Long COVID	0.238	0.025	0.236	0.025	0.236	0.025
Adults ever diagnosed with COVID-19 but without Long COVID	0.157	0.016	0.159	0.016	0.158	0.017
Adults never diagnosed with COVID-19	0.140	0.012	0.140	0.012	0.139	0.012

**eTable 4.** Estimated Probabilities of Health Care Access Outcomes Using Bootstrapped Standard Errors

	(1) Main model		
	predicted probability	standard error	bootstrapped standard error
<b>Has a usual place to get health care</b>			
Adults with current Long COVID	0.828	0.016	0.017
Adults ever diagnosed with COVID-19 but without Long COVID	0.835	0.011	0.011
Adults never diagnosed with COVID-19	0.803	0.010	0.009
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Adults never diagnosed with COVID-19	0.067	0.002	0.003
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Adults never diagnosed with COVID-19	0.040	0.003	0.003
<b><i>Difficulty finding transportation</i></b>			
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Bootstrapped standard errors are based on the standard deviation of estimated predicted probabilities across 100 replications using bootstrap resampling weights.

## eReferences

<sup>1</sup> County Health Rankings & Roadmaps 2022. University of Wisconsin Population Health Institute. Accessed February 22, 2023. <https://www.countyhealthrankings.org>.