

Prevalence of COVID-19 and long COVID - Results from the 2022 Behavioral Risk Factor Surveillance System, 50 states.

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Abstract

Recent MMWR results estimate long COVID prevalence at 6.0% in June 2023, while the percentage of those with COVID reporting long COVID was 11.0%. The 2022 Behavioral Risk Factor Surveillance System addressed COVID (positive test) and long COVID (symptoms lasting ≥ 3 months) in a population-based sample from each state and DC. Results for 385,617 adults indicated 34.4% had ever had COVID, 21.9% of whom reported long COVID, representing 7.4% of all adults. State rates ranged from 25.4% - 40.8% for COVID and 4.1%-11.1% for long COVID. Groups with high rates for both included women, younger adults, those with children in the household, plus those reporting obesity, asthma, chronic obstructive pulmonary disease (COPD), diabetes, or cardiovascular disease (CVD). Highest adjusted odds ratios for COVID were 2.34 (95% CI 2.20-2.49) for age 18-24 years vs. age 65+ while for long COVID it was 2.81 (2.53-3.13) for 3+ of the 5 conditions. Most frequently reported problems for those with long COVID were fatigue (26.0%), shortness of breath (18.8%), loss of taste or smell (17.2%), and memory problems (9.9%). Results show the need for state-based data and suggest a focus on younger adults is needed to address COVID and long COVID.

Introduction

Recent results estimate long COVID prevalence dropped from 7.5% in June 2022 to 6.0% in June 2023, while the percentage of those with COVID reporting long COVID dropped from 18.9% to 11.0% (1). The Behavioral Risk Factor Surveillance System (BRFSS) is an ongoing state-based telephone survey of randomly selected non-institutionalized adults that collects data on a range of health topics (2). This study used data from the 2022 BRFSS which included questions on COVID and long COVID to provide state-based rates of both along with information on groups at higher risk.

Methods

BRFSS data are publicly available from all 50 states and DC (3). The COVID questions were 1) “Has a doctor, nurse, or other health professional ever told you that you tested positive for COVID 19?” with possible responses of yes, no, or “Tested positive using home test without health professional” and 2) “Did you have any symptoms lasting 3 months or longer that you did not have prior to having coronavirus or COVID-19?” This was considered long COVID. Other measures included age, race, gender, income, children in the household, census region (Northeast, Midwest, South and West), smoking, e-cigarette use, and any HIV risk factor (recent injected drug use, STD treatment or exchanging sex for money or drugs). A composite measure of 5 chronic conditions (obesity, asthma, cardiovascular disease (CVD), diabetes, and COPD (Chronic Obstructive Pulmonary Disease) found to be associated with US hospitalizations for COVID (4, 5) was also included. Data were weighted to adjust for the probability of selection and to reflect the adult population of each state by age group, race/ethnicity, education level, marital status, and home ownership. Stata version 18.0 (StataCorp LLC, College Station TX) was used to account for the complex sample design of the BRFSS in unadjusted analysis and also

controlled for the listed factors in logistic regression. Missing values for any measure were excluded from analysis. The median response rate for the 50 states plus DC for land line and cell phone surveys combined was 45.1% ranging from 36.2% in CA to 66.8% in SD. A total of 385,617 respondents were included in the analysis with state N's ranging from 3,188 in NV to 26,152 in WA and a median N of 7, 473.

Results

Results (Table 1) indicate that 34.4% of respondents had ever had a positive test for COVID, ranging from 25.4% in OR to 40.8% in MS. One in five adults with COVID (21.9%) reported long COVID, ranging from 14.2% in HI to 29.2% in WV, representing 7.4% of all adults, with a range from 4.1% in HI to 11.1% in WV. Higher rates for COVID were found for women with children in the household (42.8%), current e-cigarette users (41.5%), (but not for smokers), younger adults (39.4-40.7% for 18-44-year-old age groups), income >\$75K ($\geq 39.5\%$), extreme obesity (39.8%), HIV risk (43.2%), and current asthma (40.0%). Higher rates for long COVID were reported by most of these same groups plus the South and Midwest regions (7.8% and 7.7% respectively), adults on Medicaid (9.4%), and those with more of the 5 chronic conditions. Among adults with none of the 5 comorbidities, 5.7% reported long COVID compared with 12.1% of those with 3 or more. Results were confirmed by logistic regression using models including these measures plus demographics (Table 2). Other factors with higher rates among those reporting long COVID such as cognitive difficulties (12.1%), depression (11.8%), or a cost barrier to health care (13.0%) might have resulted from long COVID and were not included in logistic regression models. The problems most frequently reported by those with long COVID were fatigue (26.0%), breathing problems (18.8%), loss of taste or smell (17.2%), and memory

problems (9.9%), while 22.9% reported some other problem and 5.1% reported no long-term symptoms that limited activities.

Discussion

Population based data from the BRFSS provide new information on COVID and long COVID.

First is the wide range in rates of both COVID and long COVID among the states which translated to regional differences only for long COVID and remained when results were controlled for all the measures included in logistic regression. Five states had adjusted odds ratios of 2.0 or higher for long COVID. Second, one in five adults with a positive COVID test reported long COVID, again showing a wide range across states. Third, some groups at risk were different from those identified earlier. High risk groups for COVID and long COVID appear to reflect younger age groups with higher income compared with groups identified early in the pandemic based on hospitalizations (4, 5). The elderly/retired, smokers, low-income adults, and most minorities appear at low risk. However, those reporting any of obesity, diabetes, COPD, CVD, and asthma – conditions identified as increasing risk of COVID hospitalizations (4) – generally reported higher rates of both COVID and long COVID although results for the separate measures differed. The role of obesity in COVID risk appears to be present even when the outcome is cases rather than deaths (6). The prevalence rate for long COVID of 7.4% among all adults is consistent with that recently reported (1), but much higher than the 1.7% in another study where long COVID was defined as symptoms lasting 2 months (7) and not as “ever”. However, these current results for the most common problems reported for long COVID are similar to those from a meta-analysis (8). Another factor to consider in risk is the number of respondents reporting the measure. For example, obesity and reporting a risk for HIV appear to

increase rates of COVID and long COVID approximately the same amount (Tables 1 & 2) but there were about seven times as many respondents with obesity as reporting HIV risk (121,000 vs. 17,000).

Limitations: There are at least four limitations to this study. First, because the BRFSS only surveys households, among the institutions the survey omits are nursing homes and prisons which appeared to have high rates of COVID especially early in the pandemic. Thus, results may underestimate the true rates of COVID and long COVID. Second, results are self-reported and except as noted for COVID are not based on an actual test or diagnosis; the implications of this limitation are unknown. Third, the lack of a measure of hypertension on the survey for 2022 meant that the composite measure of comorbidities lacked a key component (5). Fourth, survey results can't distinguish cause and effect so results indicating higher rates of poor health, cognitive disability, frequent activity limitation, and reporting a cost barrier to health care for those reporting long COVID only indicate an association so were omitted from logistic regression.

Implications for public health: These results show that younger adults and especially women with children in the household, appear to be a high-risk group for COVID and long COVID. Results also confirm that 5 of the 6 comorbidities that were found to increase risk of hospitalization for COVID are also associated with long COVID which affected one-fifth of adults with COVID. A potential key factor not included in this study is vaccines (9) where data are only available for about half the states. The wide range in rates of COVID and long COVID across states even when controlled for a range of demographic and health measures should be recognized and addressed, along with regional differences in long COVID. The finding of long-term memory problems reported by 9.9% of those with long COVID along with higher rates of

both COVID and long COVID reported by respondents reporting cognitive difficulties, underscores the need for continued monitoring of cognitive health among all ages and not limited to ages 45+.

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Table 1. COVID and Long COVID, 2022 Behavioral Risk Factor Surveillance System, 50 states. N=338,465 for COVID, 336,082 for long COVID. Results from weighted analysis in Stata, State N's ranged from 3,188 in NV-26,152 in WA, median=7,473.

Comorbidities: obesity, diabetes, cardiovascular disease (CVD), asthma, or chronic obstructive pulmonary disease (COPD).

Measure>>>>	COVID Positive		Long COVID ≥ 3 months	
Population Group	% (95% CI)	Sample Size	% (95% CI)	Sample Size
Total	34.4 (34.0-34.7)	385,617	7.4 (7.3-7.6)	382,720
Gender				
Males	32.7 (32.3-33.2)	181,831	5.6 (5.4-5.8)	180,674
Females	35.9 (35.5-36.4)	203,786	9.2 (8.9-9.5)	202,046
P value	<0.0001		<0.0001	
Age (years)				
18-24	39.4 (38.3-40.5)	23,304	7.3 (6.8-7.8)	23,186
25-34	40.7 (39.8-41.5)	41,040	8.7 (8.2-9.2)	40,742
35-44	40.2 (39.3-41.0)	50,548	9.6 (9.0-10.1)	50,095
45-54	37.1 (36.3-37.9)	56,479	8.9 (8.4-9.3)	55,938
55-64	32.0 (31.3-32.8)	71,567	7.2 (6.9-7.6)	70,946
65+	23.0 (22.5-23.5)	142,679	4.3 (4.1-4.6)	141,813
P value	<0.0001		<0.0001	
Race/ethnicity				
White (non-Hispanic)	34.0 (33.7-34.4)	287,526	7.5 (7.3-7.6)	285,262
Black	32.6 (31.6-33.6)	28,892	6.5 (6.0-7.1)	28,750
Hispanic	36.1 (34.0-38.2)	8,379	10.2 (9.0-11.6)	8,306
Am Indian/AK Native	33.4 (30.9-36.1)	6,048	9.7 (8.2-11.3)	6,004
Asian	33.1 (31.4-34.9)	12,070	4.0 (3.3-4.8)	11,993
Other	37.6 (36.6-38.7)	31,703	8.6 (8.0-9.2)	31,527
P value	<0.0001		<0.0001	
Education				
<High school	27.6 (26.4-28.8)	21,252	6.6 (6.0-7.3)	21,138
High school	33.4 (32.8-34.0)	92,369	7.1 (6.8-7.5)	91,757
Some college	36.4 (35.8-37.0)	105,272	8.9 (8.6-9.3)	104,449
College grad	35.8 (35.3-36.3)	165,257	6.5 (6.3-6.8)	163,923
P value	<0.0001		<0.0001	
Income				
<\$35K	30.3 (29.6-31.0)	85,576	8.0 (7.7-8.4)	85,062
\$35-75K	35.0 (34.3-35.6)	96,543	8.1 (7.7-8.5)	95,904
\$75-\$150	39.5 (38.9-40.2)	91,243	8.1 (7.7-8.5)	90,506
>\$150K	39.6 (38.7-40.6)	42,440	6.5 (6.0-7.0)	42,111
unk	29.3 (28.6-30.1)	69,811	5.7 (5.4-6.1)	69,133
P value	<0.0001		<0.0001	
Census Region				
Northeast	34.5 (33.8-35.2)	72,985	6.7 (6.3-7.1)	72,423
Midwest	34.1 (33.6-34.6)	103,187	7.7 (7.4-8.0)	102,387
South	34.5 (34.0-35.1)	109,288	7.8 (7.5-8.1)	108,483
West	34.2 (33.5-35.0)	100,157	7.1 (6.7-7.5)	99,427
P value	0.676		<0.0001	
Employment				

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Employed/SE	39.6 (39.2-40.1)	196,577	8.4 (8.1-8.6)	194,927
Out of work	32.0 (30.5-33.5)	14,354	8.6 (7.8-9.4)	14,250
Homemaker	30.1 (28.5-31.7)	14,783	7.9 (7.0-9.0)	14,674
Student	39.9 (38.1-41.6)	9,897	6.7 (5.9-7.6)	9,836
Retired	22.6 (22.0-23.2)	122,977	4.2 (3.9-4.5)	122,253
Unable to work	28.5 (27.3-29.7)	23,549	9.3 (8.6-10.0)	23,336
P value	<0.0001		<0.0001	
Any kids in household				
Yes	40.7 (40.1-41.3)	95,201	9.6 (9.2-10.0)	94,408
No	31.3 (30.9-31.7)	286,813	6.4 (6.2-6.6)	284,753
P value	<0.0001		<0.0001	
4-level gender/kids measure				
Male/no kids	30.3 (29.8-30.9)	137,056	5.0 (4.8-5.2)	136,222
Female w/kids	42.8 (41.9-43.6)	52,386	11.9 (11.4-12.5)	51,897
Female/no kids	32.3 (31.7-32.8)	149,757	7.8 (7.5-8.1)	148,531
Male w/kids	38.2 (37.3-39.1)	42,815	6.8 (6.4-7.3)	42,511
P value	<0.0001		<0.0001	
Weight status				
Not overweight	31.8 (31.2-32.4)	111,810	5.8 (5.5-6.1)	111,082
Overweight only	34.2 (33.6-34.7)	126,543	6.8 (6.5-7.1)	125,671
Obese	37.7 (37.2-38.3)	121,223	9.8 (9.5-10.2)	120,174
P value	<0.0001		<0.0001	
Leisure time activity				
Yes	35.2 (34.8-35.6)	294,259	7.3 (7.1-7.5)	292,119
No	31.6 (31.0-32.3)	90,539	7.9 (7.5-8.3)	89,798
P value	<0.0001		<0.0001	
Smoking Status				
Non-Smoker	35.4 (35.0-35.7)	336,687	7.5 (7.3-7.7)	334,139
Current smoker	27.6 (26.8-28.4)	46,090	7.3 (6.8-7.8)	45,790
P value	<0.0001		0.4	
Current E-cigarette use				
Yes	41.5 (40.3-42.8)	20,570	10.0 (9.3-10.7)	20,410
No	33.8 (33.5-34.2)	363,508	7.2 (7.1-7.4)	360,791
P value	<0.0001		<0.0001	
Binge drinker				
Yes	40.8 (40.0-41.6)	54,393	8.1 (7.7-8.6)	54,004
No	33.2 (32.9-33.6)	323,109	7.4 (7.2-7.5)	320,690
P value	<0.0001		0	
Depression diagnosis ever				
Yes	38.2 (37.6-38.9)	81,551	11.8 (11.4-12.3)	80,734
No	33.3 (33.0-33.7)	301,811	6.2 (6.0-6.4)	299,777
P value	0.732		<0.0001	
Type insurance				
Through employer (#1)	40.6 (40.1-41.2)	141,659	8.2 (7.9-8.5)	140,408
Private (#2)	36.5 (35.3-37.7)	30,953	7.5 (6.9-8.2)	30,718
Medicare (3)	24.6 (24.0-25.2)	120,746	5.2 (4.9-5.5)	119,976
Other Gov't (4-10)	34.2 (33.5-35.1)	59,112	8.8 (8.4-9.3)	58,676
None (88)	28.9 (27.7-30.2)	19,086	7.5 (6.8-8.2)	18,984

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	P value	<0.0001		<0.0001	
Medicaid					
No		34.5 (34.2-34.9)	348,140	7.3 (7.2-7.5)	345,530
Yes		34.5 (33.3-35.7)	23,416	9.4 (8.7-10.1)	23,232
	P value	0.076		<0.0001	
Check-up in 2 years					
Yes		35.0 (34.6-35.3)	340,452	7.6 (7.4-7.8)	337,861
No		30.8 (29.9-31.7)	40,447	6.5 (6.1-6.9)	40,188
	P value	<0.0001		<0.0001	
Deaf or difficulty hearing					
Yes		29.2 (28.1-30.3)	35,342	8.0 (7.4-8.7)	35,036
No		34.8 (34.5-35.1)	348,869	7.4 (7.2-7.6)	346,298
	P value	<0.0001		0.1	
Serious difficulty seeing					
Yes		31.0 (29.7-32.5)	20,674	8.8 (8.1-9.6)	20,469
No		34.6 (34.3-34.9)	363,750	7.3 (7.2-7.5)	361,081
	P value	<0.0001		<0.0001	
Difficulty walking					
Yes		29.1 (28.3-29.9)	61,620	9.4 (9.0-10.0)	61,053
No		35.2 (34.9-35.6)	322,636	7.1 (6.9-7.3)	320,335
	P value	<0.0001		<0.0001	
Difficulty dressing/bathing					
Yes		29.6 (28.0-31.2)	15,101	10.4 (9.4-11.4)	14,955
No		34.5 (34.2-34.9)	369,917	7.3 (7.1-7.5)	367,179
	P value	<0.0001		<0.0001	
Difficulty doing errands alone					
Yes		30.6 (29.5-31.7)	29,470	10.5 (9.8-11.3)	29,165
No		34.7 (34.4-35.0)	354,920	7.2 (7.0-7.3)	352,353
	P value	<0.0001		<0.0001	
Cognitive difficulties					
Yes		36.3 (35.4-37.2)	45,630	12.1 (11.5-12.7)	45,149
No		34.1 (33.8-34.5)	337,402	6.7 (6.5-6.9)	335,041
	P value	<0.0001		<0.0001	
Any CVD					
Yes		28.6 (27.7-29.6)	45,927	7.8 (7.3-8.3)	45,538
No		35.0 (34.7-35.4)	335,428	7.4 (7.2-7.6)	332,977
	P value	<0.0001		0.1	
Diabetes					
Yes		32.1 (31.2-33.0)	52,962	8.1 (7.6-8.6)	52,540
No		34.7 (34.4-35.0)	331,905	7.3 (7.2-7.5)	329,435
	P value	<0.0001		<0.0001	
Current asthma					
Yes		40.0 (39.0-41.1)	39,955	13.1 (12.4-13.8)	39,517
No		33.7 (33.4-34.1)	342,408	6.8 (6.6-7.0)	339,997
	P value	<0.0001		<0.0001	
COPD					
Yes		30.8 (29.8-31.9)	31,367	11.0 (10.2-11.7)	31,046
No		34.6 (34.3-35.0)	352,509	7.2 (7.0-7.3)	349,968

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	P value	<0.0001		<0.0001	
Obese					
Yes		37.7 (37.2-38.3)	121,223	9.8 (9.5-10.2)	120,174
No		33.0 (32.6-33.4)	238,353	6.3 (6.1-6.5)	236,753
	P value	<0.0001		<0.0001	
Any of 5 comorbidities					
No		33.8 (33.3-34.3)	169,540	5.7 (5.5-6.0)	168,518
Yes		35.6 (35.1-36.0)	181,781	9.2 (8.9-9.5)	180,268
	P value	<0.0001		<0.0001	
Number of co-morbidities					
0		33.8 (33.3-34.3)	169,540	5.7 (5.5-6.0)	168,518
1		35.8 (35.2-36.4)	116,002	8.4 (8.0-8.7)	115,088
2		35.1 (34.1-36.0)	45,870	10.4 (9.8-11.0)	45,479
3 or more		34.8 (33.4-36.1)	19,909	12.2 (11.2-13.0)	19,701
	P value	<0.0001		<0.0001	
Health Status					
Fair or poor		33.1 (32.3-33.9)	68,613	10.5 (10.0-10.9)	67,926
Good or better		34.7 (34.3-35.0)	316,045	6.8 (6.6-7.0)	313,854
	P value	0.0003		<0.0001	
FMD					
Yes		38.4 (37.6-39.2)	52,528	12.0 (11.4-12.5)	51,964
No		33.7 (33.3-34.0)	325,626	6.6 (6.4-6.8)	323,388
	P value	<0.0001		<0.0001	
FAL					
Yes		35.9 (34.9-36.9)	37,131	12.2 (11.5-12.9)	36,615
No		34.3 (33.9-34.6)	343,207	6.9 (6.7-7.1)	340,900
	P value	0.003		<0.0001	
Weight status					
Underweight		29.4 (26.7-32.4)	6,067	6.4 (5.0-8.1)	6,035
Healthy weight		31.9 (31.4-32.5)	105,743	5.8 (5.5-6.0)	105,047
Overweight only		34.2 (33.6-34.7)	126,543	6.8 (6.5-7.1)	125,671
Obese (30-34.9)		36.2 (35.5-37.0)	70,712	8.7 (8.3-9.2)	70,137
Obese 2 (35+)		39.8 (38.9-40.6)	50,511	11.3 (10.7-11.9)	50,037
	P value	<0.0001		<0.0001	
HIV risk					
No		33.8 (33.5-34.1)	367,474	7.2 (7.1-7.4)	364,738
Yes		43.2 (41.8-44.6)	16,651	10.6 (9.7-11.5)	16,521
	P value	<0.0001		<0.0001	
State					
AL		38.6 (36.5-40.7)	4,183	10.6 (9.3-12.1)	4,158
AK		37.7 (35.9-39.6)	5,231	7.5 (6.5-8.6)	5,199
AZ		36.6 (34.9-38.3)	8,852	8.2 (7.3-9.2)	8,788
AR		35.0 (33.2-36.9)	4,483	8.2 (7.2-9.3)	4,450
CA		35.8 (34.4-37.3)	9,205	6.7 (5.9-7.5)	9,132
CO		32.3 (31.1-33.6)	8,367	7.3 (6.6-8.0)	8,306
CT		37.7 (36.1-39.3)	8,165	6.3 (5.6-7.1)	8,098
DE		34.8 (32.5-37.1)	3,447	6.7 (5.5-8.2)	3,419
DC		29.5 (27.2-31.9)	2,796	4.4 (3.4-5.7)	2,783

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FL	32.3 (30.6-34.1)	11,327	6.9 (6.0-7.9)	11,268
GA	34.5 (32.9-36.2)	7,841	7.7 (6.8-8.6)	7,790
HI	29.2 (27.7-30.7)	7,092	4.2 (3.5-4.8)	7,068
ID	33.1 (31.7-34.6)	6,013	8.8 (7.9-9.7)	5,958
IL	34.1 (32.1-36.1)	3,638	7.2 (6.3-8.3)	3,619
IN	34.0 (32.7-35.2)	8,845	7.9 (7.2-8.6)	8,783
IA	33.4 (32.1-34.8)	8,257	7.7 (7.0-8.5)	8,213
KS	35.2 (33.9-36.5)	10,252	8.2 (7.4-8.9)	10,159
KY	36.5 (34.3-38.7)	3,820	8.0 (6.8-9.3)	3,785
LA	38.5 (36.7-40.4)	4,943	9.1 (8.1-10.3)	4,913
ME	26.9 (25.7-28.2)	10,187	5.3 (4.7-6.0)	10,115
MD	31.3 (30.1-32.6)	13,886	5.2 (4.6-5.9)	13,785
MA	33.4 (32.1-34.6)	10,164	5.8 (5.2-6.5)	10,072
MI	31.9 (30.7-33.3)	8,610	7.4 (6.7-8.2)	8,546
MN	34.2 (33.3-35.4)	14,629	7.2 (6.7-7.8)	14,499
MS	40.8 (38.8-42.8)	3,950	9.5 (8.4-10.7)	3,922
MO	34.2 (32.7-35.7)	7,027	8.3 (7.5-9.2)	6,967
MT	36.0 (34.5-37.5)	6,662	10.2 (9.2-11.2)	6,597
NE	33.6 (32.0-35.3)	6,881	8.1 (7.2-9.1)	6,855
NV	36.3 (33.7-39.0)	2,764	8.5 (7.1-10.3)	2,743
NH	31.0 (29.2-32.9)	5,843	5.7 (4.9-6.7)	5,806
NJ	33.9 (32.3-35.5)	6,592	7.1 (6.3-8.0)	6,547
NM	34.7 (32.6-36.8)	4,388	8.0 (6.8-9.3)	4,356
NY	35.9 (34.8-37.1)	15,082	6.6 (6.0-7.2)	14,978
NC	31.9 (30.0-33.7)	4,205	7.0 (6.1-8.0)	4,183
ND	39.5 (37.7-41.4)	3,913	10.0 (8.8-11.3)	3,881
OH	34.9 (33.7-36.1)	14,113	8.3 (7.7-9.0)	13,990
OK	37.9 (36.3-39.5)	5,245	10.2 (9.3-11.2)	5,187
OR	25.4 (24.0-26.8)	5,475	5.5 (4.8-6.3)	5,423
PA	34.3 (32.3-36.5)	4,271	7.5 (6.4-8.8)	4,236
RI	34.2 (32.4-36.2)	4,974	5.8 (4.9-6.8)	4,928
SC	34.4 (33.0-35.9)	8,476	7.4 (6.7-8.2)	8,423
SD	36.0 (32.6-39.6)	7,232	8.6 (6.2-11.7)	7,164
TN	38.3 (36.4-40.2)	4,653	10.2 (9.1-11.5)	4,608
TX	34.7 (33.2-36.3)	12,220	7.9 (7.1-8.8)	12,135
UT	37.6 (36.2-38.9)	8,837	9.6 (8.8-10.5)	8,771
VT	28.9 (27.4-30.5)	7,707	4.7 (4.0-5.5)	7,643
VA	31.8 (30.4-33.3)	9,151	6.8 (6.1-7.6)	9,067
WA	29.3 (28.5-30.1)	23,594	5.9 (5.6-6.4)	23,433
WV	38.5 (36.8-40.3)	4,662	11.1 (10.0-12.3)	4,607
WI	34.7 (33.4-36.0)	9,790	7.0 (6.4-7.7)	9,711
WY	37.1 (35.1-39.2)	3,677	10.0 (8.8-11.4)	3,653
Total	34.4 (34.0-34.7)	385,617	7.4 (7.3-7.6)	382,720
	P value	<0.0001	<0.0001	

Table 2. Results of logistic regression, controlled for the measures listed, 2022 Behavioral Risk Factor Surveillance System, 50 states & DC, N=338,465 for COVID, 336,082 for long COVID.

State N's ranged from 3,188 in NV-26,152 in WA, median=7,473.

HI with lowest rate for COVID was chosen as referent for both measures.

COVID risks=obesity, diabetes, cardiovascular disease, chronic obstructive pulmonary disease, asthma.

Outcome>>>	COVID Positive		Long COVID ≥3 months	
Group	AOR (95% CI)	P value	AOR (95% CI)	P value
Females w/kids v M, no kids	1.45 (1.38-1.52)	<0.0001	2.22 (2.04-2.41)	<0.0001
F no kids v M no kids	1.20 (1.15-1.24)	<0.0001	1.76 (1.65-1.89)	<0.0001
M w/kids v M no kids	1.15 (1.09-1.20)	<0.0001	1.18 (1.08-1.30)	<0.0001
55-64 years v 65+	1.49 (1.42-1.57)	<0.0001	1.79 (1.64-1.96)	<0.0001
45-54 years v 65+	1.79 (1.70-1.89)	<0.0001	2.24 (2.04-2.47)	<0.0001
35-44 years v 65+	2.00 (1.89-2.12)	<0.0001	2.41 (2.17-2.68)	<0.0001
25-34 years v 65+	2.21 (2.10-2.34)	<0.0001	2.35 (2.13-2.61)	<0.0001
18-24 years v 65+	2.34 (2.20-2.49)	<0.0001	2.21 (1.97-2.48)	<0.0001
Black v non-Hispanic white	0.87 (0.83-0.92)	<0.0001	0.73 (0.67-0.81)	<0.0001
Hispanic v non-Hispanic white	0.98 (0.89-1.08)	0.655	1.23 (1.05-1.43)	0.009
Am. Indian v non_Hispanic white	0.94 (0.83-1.07)	0.358	1.13 (0.92-1.39)	0.241
Asian v. non_Hispanic white	0.85 (0.78-0.93)	0.001	0.53 (0.43-0.66)	<0.0001
Other v. non_Hispanic white	1.10 (1.05-1.17)	<0.0001	1.06 (0.97-1.16)	0.203
\$25-<\$50K v < \$25K	1.30 (1.22-1.38)	<0.0001	1.12 (1.01-1.24)	0.03
\$50-<\$75K v < \$25K	1.51 (1.42-1.61)	<0.0001	1.21 (1.09-1.35)	<0.0001
\$75K-<\$100K v < \$25K	1.66 (1.56-1.78)	<0.0001	1.27 (1.13-1.42)	<0.0001
\$100K+ v <\$25K	1.79 (1.69-1.90)	<0.0001	1.08 (0.97-1.20)	0.159
Unk inc v <\$25K	1.14 (1.07-1.22)	<0.0001	0.88 (0.78-0.98)	0.022
1 COVID risk v 0	1.18 (1.13-1.22)	<0.0001	1.51 (1.42-1.62)	<0.0001
2 COVID risk v 0	1.37 (1.30-1.44)	<0.0001	2.21 (2.04-2.39)	<0.0001
3 COVID risk v 0	1.56 (1.45-1.67)	<0.0001	2.81 (2.53-3.13)	<0.0001
HIV risk* v no	1.22 (1.15-1.30)	<0.0001	1.29 (1.17-1.44)	<0.0001
E-cigarettes v no	1.12 (1.06-1.19)	<0.0001	1.18 (1.08-1.30)	<0.0001
State				
AL v HI	1.46 (1.29-1.67)	<0.0001	2.27 (1.77-2.91)	<0.0001
AK v HI	1.25 (1.11-1.41)	<0.0001	1.38 (1.07-1.76)	0.012
AZ v HI	1.29 (1.15-1.46)	<0.0001	1.54 (1.21-1.95)	<0.0001
AR v HI	1.24 (1.09-1.40)	0.001	1.55 (1.21-1.97)	<0.0001
CA v HI	1.27 (1.14-1.42)	<0.0001	1.45 (1.15-1.83)	0.002
CO v HI	1.00 (0.90-1.11)	0.942	1.47 (1.18-1.83)	0.001
CT v HI	1.36 (1.21-1.53)	<0.0001	1.32 (1.05-1.67)	0.02
DE v HI	1.21 (1.05-1.39)	0.009	1.39 (1.04-1.86)	0.028
DC v HI	0.89 (0.76-1.03)	0.108	0.96 (0.69-1.34)	0.814
FL v HI	1.12 (0.99-1.26)	0.084	1.45 (1.13-1.86)	0.003
GA v HI	1.22 (1.09-1.38)	0.001	1.62 (1.28-2.05)	<0.0001
ID v HI	1.10 (0.98-1.23)	0.105	1.75 (1.40-2.20)	<0.0001
IL v HI	1.15 (1.01-1.31)	0.036	1.49 (1.16-1.92)	0.002
IN v HI	1.15 (1.03-1.28)	0.011	1.54 (1.24-1.91)	<0.0001
IA v HI	1.10 (0.98-1.22)	0.099	1.47 (1.17-1.83)	0.001
KS v HI	1.16 (1.04-1.29)	0.006	1.60 (1.28-1.99)	<0.0001

KY v HI	1.27 (1.11-1.46)	0.001	1.47 (1.13-1.91)	0.005
LA v HI	1.42 (1.26-1.60)	<0.0001	1.73 (1.36-2.20)	<0.0001
ME v HI	0.87 (0.77-0.97)	0.011	1.05 (0.82-1.33)	0.711
MD v HI	1.01 (0.91-1.12)	0.854	1.04 (0.82-1.31)	0.748
MA v HI	1.14 (1.02-1.26)	0.019	1.21 (0.96-1.51)	0.101
MI v HI	1.07 (0.96-1.19)	0.251	1.47 (1.17-1.84)	0.001
MN v HI	1.14 (1.03-1.26)	0.011	1.14 (1.16-1.78)	0.001
MS v HI	1.65 (1.46-1.88)	<0.0001	1.98 (1.55-2.52)	<0.0001
MO v HI	1.18 (1.05-1.32)	0.005	1.68 (1.34-2.10)	<0.0001
MT v HI	1.27 (1.13-1.42)	<0.0001	2.03 (1.62-2.54)	<0.0001
NE v HI	1.10 (0.98-1.24)	0.107	1.56 (1.24-1.96)	<0.0001
NV v HI	1.24 (1.06-1.44)	0.006	1.75 (1.31-2.33)	<0.0001
NH v HI	0.99 (0.87-1.12)	0.861	1.14 (0.87-1.49)	0.335
NJ v HI	1.16 (1.03-1.30)	0.011	1.63 (1.28-2.07)	<0.0001
NM v HI	1.17 (1.02-1.33)	0.026	1.43 (1.09-1.86)	0.009
NY v HI	1.29 (1.17-1.43)	<0.0001	1.43 (1.15-1.78)	0.002
NC v HI	1.13 (1.00-1.28)	0.058	1.53 (1.19-1.95)	0.001
ND v HI	1.42 (1.26-1.61)	<0.0001	1.99 (1.57-2.52)	<0.0001
OH v HI	1.19 (1.08-1.33)	0.001	1.57 (1.27-1.94)	<0.0001
OK v HI	1.34 (1.20-1.51)	<0.0001	1.93 (1.55-2.41)	<0.0001
OR v HI	0.76 (0.68-0.86)	<0.0001	1.05 (0.82-1.35)	0.676
PA v HI	1.19 (1.03-1.36)	0.014	1.47 (1.12-1.93)	0.005
RI v HI	1.14 (1.00-1.29)	0.043	1.11 (0.85-1.45)	0.456
SC v HI	1.25 (1.12-1.40)	<0.0001	1.61 (1.29-2.02)	<0.0001
SD v HI	1.23 (1.03-1.48)	0.023	1.42 (1.02-1.96)	0.036
TN v HI	1.37 (1.21-1.55)	<0.0001	2.00 (1.58-2.54)	<0.0001
TX v HI	1.11 (0.99-1.25)	0.071	1.54 (1.23-1.92)	<0.0001
UT v HI	1.20 (1.08-1.34)	0.001	1.82 (1.46-2.25)	<0.0001
VT v HI	0.95 (0.85-1.07)	0.413	0.96 (0.74-1.25)	0.753
VA v HI	1.03 (0.92-1.15)	0.625	1.39 (1.10-1.75)	0.005
WA v HI	0.90 (0.82-0.98)	0.021	1.15 (0.94-1.41)	0.164
WV v HI	1.46 (1.30-1.65)	<0.0001	2.14 (1.70-2.69)	<0.0001
WI v HI	1.18 (1.06-1.32)	0.002	1.33 (1.07-1.66)	0.011
WY v HI	1.32 (1.16-1.50)	<0.0001	2.05 (1.61-2.62)	<0.0001
COVID risks if entered separately				
Obesity	1.21 (1.17-1.25)	<0.0001	1.42 (1.34-1.51)	<0.0001
Diabetes	1.14 (1.08-1.19)	<0.0001	1.19 (1.09-1.29)	<0.0001
Cardiovascular disease	1.06 (1.01-1.13)	0.03	1.28 (1.17-1.39)	<0.0001
COPD	1.01 (0.95-1.08)	0.76	1.46 (1.31-1.62)	<0.0001
Asthma	1.25 (1.19-1.32)	<0.0001	1.65 (1.52-1.78)	<0.0001

Abbreviations: AOR: adjusted odds ratio; COPD: chronic obstructive pulmonary disease;

Unk: unknown.

* HIV risk: Any in past year: Injected a non-prescribed drug; treated for a sexually transmitted disease; exchanged money or drugs for sex.