

# Symptoms of Posttraumatic Stress During the COVID-19 Pandemic in the Governmental Public Health Workforce and General Population

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## ABSTRACT

We aimed to estimate the prevalence of COVID-19–related posttraumatic stress symptoms (PTSS) in the governmental public health workforce and in US adults, assess differences in reporting PTSS within subgroups, and evaluate whether frontline workers reported higher levels of PTSS than persons in other jobs. We used data from 2 nationally representative studies: the 2021 Public Health Workforce Interests and Needs Survey (PH WINS) and the COVID-19 and Life Stressors Impact on Mental Health and Well-being (CLIMB) study. Our study found that the state and local governmental public health workforce was more likely to report PTSS than the general adult population. Almost a quarter of public health agency employees (24.7%) and 21.1% of adults reported at least 3 symptoms of posttraumatic stress. Differences in levels of PTSS appeared within demographic groups for both samples. Personal care and service frontline workers had 4.3 times the odds of reporting symptoms of posttraumatic stress than non-frontline workers.

**KEY WORDS:** COVID-19, governmental public health workforce, health care workforce well-being, posttraumatic stress symptoms (PTSS), Public Health Workforce Interests and Needs Survey (PH WINS)

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**Human Participant Compliance Statement:** PH WINS 2021 was determined to be exempt from ongoing review by the NORC Institutional Review Board (IRB protocol no. 21-08-422). CLIMB 2020 and 2021 were determined to be exempt by the NORC Institutional Review Board (IRB protocol no. 20-03-17).

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The COVID-19 pandemic led to worsening mental health in the US population,<sup>1</sup> with the mental health of health care workers responding to COVID-19 being particularly vulnerable.<sup>2-5</sup> The governmental public health workforce has played an essential role in responding to the pandemic, particularly in keeping public health systems and infrastructure afloat to sustain the increased demand for health services.<sup>6</sup> Yet, the influence of the pandemic on the mental health of the public health workforce has been less studied than has the impact on other health professions.<sup>7-9</sup>

Elevated symptoms of anxiety, depression, and posttraumatic stress disorder (PTSD) during the COVID-19 pandemic have been well documented.<sup>10-12</sup> In March through April 2020, 22% of US adults

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reported symptoms of PTSD.<sup>11</sup> Furthermore, a survey of state, tribal, local, and territorial public health workers fielded in the spring of 2021 by the Centers for Disease Control and Prevention (CDC) found that more than one-third (36.8%) of respondents reported symptoms of PTSD<sup>13</sup>; however, this study was limited through its use of a non-probability-based convenience sample.

This research brief estimates the prevalence of elevated levels of COVID-19–related posttraumatic stress symptoms (PTSS) in the governmental public health workforce compared with estimates in the US general adult population in 2021.

## Methods

### *Data collection and sample*

We used data from 2 studies, which were each representative of the public health workforce and the US adult population, respectively. The Public Health Workforce Interests and Needs Survey (PH WINS) was fielded to a nationally representative sample of the governmental public health workforce from September 13, 2021, to January 14, 2022. The final sample for this brief includes employees of health agencies serving a population greater than 25 000 ( $n = 42\,929$ ). Details on instrument creation, sampling, fielding, and considerations for analysis can be found in the supplemental materials (see Supplemental Digital Content 1, available at <http://links.lww.com/JPHMP/B245>) and the PH WINS methodology report.<sup>14</sup>

The COVID-19 and Life Stressors Impact on Mental Health and Well-being (CLIMB) study was fielded to a nationally representative sample of US adults using the AmeriSpeak panel, with a sampling frame that covers 97% of US households.<sup>15</sup> We used data from wave 2 of the CLIMB study collected from March 24, 2021, through April 19, 2021, for the primary analysis. We used workforce data from wave 1, collected from March 31, 2020, through April 13, 2020, to inform our subgroup analyses. The final analytic sample for this study of participants who completed the PTSS screening instrument included 1168 participants. The CLIMB study was used to establish a national baseline of PTSS in the US adult population. We also used the CLIMB study to estimate the prevalence of PTSS in frontline workers as defined by the CDC at the time.<sup>16,17</sup>

Our main outcome measure was PTSS, which were measured using the same screening instrument across both surveys: we measured the prevalence of reported symptoms of posttraumatic stress using the 4-item Primary Care Posttraumatic Stress Disorder

Screen (PC-PTSD) about posttraumatic stress from the COVID-19 pandemic.<sup>18</sup> The PC-PTSD is a screening tool that assesses the primary characteristics of PTSD, including reexperiencing, numbing, avoidance, and hyperarousal regarding a particularly disturbing experience.<sup>18</sup> The same language was used in both the PH WINS survey and the CLIMB study to allow comparison between the 2 samples. We measured elevated symptoms of posttraumatic stress defined by the presence of 3 or more symptoms of posttraumatic stress using the 4-item PC-PTSD about posttraumatic stress from the COVID-19 pandemic, as is consistent with the literature and national guidelines.<sup>18,19</sup> Covariate specifications are provided in the Supplemental Digital Content (available at <http://links.lww.com/JPHMP/B245>).

### *Analysis*

To show the characteristics of the PH WINS and CLIMB samples, which are representative of the public health workforce and the US adult population, respectively, we reported the demographic details of the 2 study samples. We then estimated the weighted prevalence of symptoms of 3 or more symptoms of posttraumatic stress, as recommended by the National Center for PTSD.<sup>19</sup> We used survey weights to estimate symptoms of posttraumatic stress reported by a representative sample of governmental health workers using the PH WINS data and by a representative sample of US adults using the CLIMB data. To test for differences in reporting 3 or more symptoms of posttraumatic stress across the US public health workforce and the US adult population, we calculated 2-sample  $t$  tests on the means across the 2 samples. To assess the differences in distribution of elevated symptoms of posttraumatic stress within groups, we first reported the distribution of PTSS by demographic characteristics and job function in both the PH WINS and CLIMB samples (Table). To test for differences in reporting PTSS within groups (within respective samples), we used a Rao-Scott-adjusted chi-square, which corrects the Pearson  $\chi^2$  statistic to adjust for the use of complex survey weights. We used  $P > .05$  to determine significance. We also used logistic regression to estimate the unadjusted odds of reporting PTSS within each sample. We report odds ratios.

## Results

### *Public health workforce relative to the general adult population*

Compared with US adults, the state and local governmental public health agency workforce was more

**TABLE**

**Characteristics of PH WINS and CLIMB Study Sample and Distribution of Symptoms of Posttraumatic Stress in the Governmental Public Health Workforce and in US Adults During the COVID-19 Pandemic<sup>a</sup>**

	Participant Characteristics				PTSS-4: ≥3 Symptoms		PTSS-4: ≥3 Symptoms <sup>b</sup>	
	Frequency		Weighted Prevalence		PH WINS, %	CLIMB, %	aOR	CLIMB aOR
	PH WINS, n	CLIMB, n	PH WINS, %	CLIMB, %				
Overall <sup>c</sup>	42 929	1 168	24.7%	21.2%				
Gender								
Female	33 131	575	25.5%***	24.9%**	1.26***		0.78	Ref
Male	8 466	593	21.0%	17.3%	Ref			
Age, y								
18–39 <sup>d</sup>	13 272	445	33.9%***	22.1%	3.06***		1.29	
40–59	19 349	383	23.0%	23.3%	1.85***		1.46	
60+	6 176	340	13.3%	17.8%	Ref		Ref	
Individual income <sup>e</sup>								
\$0–<\$15 000	4 434	272	19.6%***	28%**	0.79***		1.88**	
\$15 000.01–\$35 000	18 627	270	25.0%	23.8%	0.94		1.62	
\$35 000.01–\$65 000	19 868	265	25.5%	14.5%	Ref		1.14	
>\$65 000							Ref	
Self-identified race and ethnicity								
Hispanic or Latino	7 163	192	24.4%***	26.4%	0.84***		1.56	
Non-Hispanic Asian	2 725	29	22.4%	11.4%	0.66***		0.49	
Non-Hispanic Black or African American	5 725	96	21.1%	22.9%	0.76***		1.26	
Non-Hispanic White	23 837	792	26.4%	20.2%	Ref		Ref	
Other race or ethnicity, including multiple races	2 279	59	24.3%	18.9%	0.90		0.87	
Educational attainment <sup>f</sup>								
High school graduate or equivalent	6 297	212	19.5%***	25.3%	0.75***		0.81	
Bachelor's degree	15 957	220	24.6%	19.2%	0.89***		0.79	
Postgraduate or higher	15 170	176	28.2%	22.2%	Ref		Ref	
Supervisory status								
No	31 410	490	23.9%***	17.8%	Ref		Ref	
Yes <sup>g</sup>	11 519	171	26.8%	19.3%	1.11***		1.12	
Setting								
State Health Agency-Central Office	14 981		24.3%***		Ref		Ref	
Big City Health Coalition local health agency	7 922		28.2%		1.24***			
All other LHDS	20 026		23.0%		0.94			

(continues)

**TABLE**  
**Characteristics of PH WINS and CLIMB Study Sample and Distribution of Symptoms of Posttraumatic Stress in the Governmental Public Health Workforce and in US Adults During the COVID-19 Pandemic<sup>a</sup> (Continued)**

	Participant Characteristics				PTSS-4: ≥3 Symptoms		PTSS-4: ≥3 Symptoms <sup>b</sup>	
	Frequency		Weighted Prevalence		aOR	aOR		
	PH WINS, n	CLIMB, n	PH WINS, %	CLIMB, %	PH WINS	PH WINS	CLIMB	CLIMB
LHD size								
LHDs serving population above 250 000	19 663		53.4%**		1.01			
LHDs serving population below 250 000	7 270		23.4%		Ref			
Health care worker <sup>h</sup>								
Yes		98		27.1%				1.0
No		562		16.6%				Ref
Frontline worker/High-risk exposure groups <sup>i</sup>								
Health care support (eg, home health aide, nursing assistant, massage therapist, dental assistant, medical assistant)		48		24.3%*				1.55
Health care practitioners and technical (eg, physician, dentist, nurse, pharmacist, physical therapist, respiratory therapist)		49		26.3%				2.16
Protective service (eg, police officer, firefighter, correctional officer, security guard, transportation screener)		23		9.5%				0.56
Personal care and service (eg, childcare worker, barber, manicurist, fitness trainer, skincare specialist, gaming service worker)		15		49.3%				4.31**
Community support (eg, social worker, therapist, counselor, probation officer, health educator)		14		3.5%				0.18
Education, training, and library (eg, teacher [K-12], teaching assistant, librarian)		61		28.4%				2.00
None of the above describes the work you do		426		14.5%				Ref

Abbreviations: aOR, adjusted odds ratio; CLIMB, COVID-19 and Life Stressors Impact on Mental Health and Well-being; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders (Fourth Edition); LHD, local health department; PH WINS, Public Health Workforce Interests and Needs Survey; PTSD, posttraumatic stress disorder; PTSS-4, posttraumatic symptoms of stress 4-item; T<sub>1</sub>, time 1; T<sub>2</sub>, time 2.

<sup>a</sup>Symptoms of posttraumatic stress (PTSS-4 item inventory) due to the COVID-19 pandemic measured using the 4-item Primary Care PTSD Screen for DSM-IV (PC-PTSD). \*P < .1; \*\*P < .05; \*\*\*P < .001. A Rao-Scott-adjusted chi-square to test for differences in reporting weighted symptoms of posttraumatic stress among groups within each sample.

<sup>b</sup>The proportion of individuals with 3 or more symptoms according to the PTSS-4 were statistically distinct between the PH WINS and CLIMB samples at a significance level of .05, among the overall sample and within each subsample implied by the table rows.

<sup>c</sup>CLIMB sample: n = 1168; 15 responses dropped for missing symptoms of posttraumatic stress. PH WINS sample: n = 42 929.

<sup>d</sup>First age category for PH WINS data is 18 years or below to 39 years.

<sup>e</sup>PH WINS individual income reflects annualized salary/wage among full-time employees.

<sup>f</sup>Education categories for CLIMB are not all shown (eg, less than a high school degree and vocational school), so frequencies do not add up to total sample.

<sup>g</sup>PH WINS supervisory status includes supervisors, managers, and executives. The CLIMB study had one missing value for supervisor status.

<sup>h</sup>Collected at T<sub>1</sub>. The CLIMB study had 2 missing values for health care worker status.

<sup>i</sup>Only persons who said they were employed full-time or part-time answered this question. From Mbaeyi,<sup>17</sup> which took categories from Baker et al.<sup>16</sup> N (frequencies) unweighted. Percentages weighted. PH WINS was fielded from September 13, 2021, to January 14, 2022. T<sub>1</sub> of the CLIMB study was collected from March 31, 2020, to April 13, 2020, and T<sub>2</sub> was collected from March 24, 2021, to April 19, 2021.

likely to report PTSS. Almost a quarter of state and local governmental public health agency employees (24.7%) and 21.1% of US adults reported at least 3 symptoms of posttraumatic stress (Table). In the CLIMB sample, more than a quarter (27.1%) of health care workers reported experiencing 3 or more symptoms of posttraumatic stress, while just under 17% of adults in non-health care jobs reported experiencing 3 or more symptoms of posttraumatic stress. Two-sample *t* tests of the proportion of individuals reporting 3 or more symptoms of posttraumatic stress were statistically distinct between the overall PHWINS and CLIMB samples, as well as within all population subgroups reported in the Table.

### ***Risk factors for elevated symptoms of posttraumatic stress***

Differences in levels of PTSS appeared within demographic groups for both the PH WINS and CLIMB samples. In both samples, women reported a higher prevalence of PTSS than men; however, the relation was only statistically significant in the PH WINS sample. For governmental public health agency employees in the PH WINS sample, age was negatively associated with the prevalence of PTSS: persons aged 18 to 39 years reported 3.06 times the odds of PTSS and persons aged 40 to 59 years reported 1.85 times the odds of PTSS as persons aged 60+ years. Significant differences in levels of PTSS also appeared across race and ethnicity groups in the US public health workforce (PH WINS sample). In both the PH WINS and CLIMB samples, being a supervisor was associated with reporting higher levels of probable PTSS than not having supervisory responsibility.

### ***Differences in reporting symptoms of posttraumatic stress within the health workforce***

There also appeared to be differences between reporting symptoms based on various frontline and high-risk exposure positions. US adults in the CLIMB sample who were frontline workers reported a higher prevalence of elevated PTSS than those who were not. Among frontline workers, persons working in personal care and service positions (eg, childcare worker, barber, manicurist, fitness trainer) reported higher levels of elevated PTSS (49.3%) than other frontline workers (CLIMB sample). More than a quarter of education workers (28.4%) and just over 26% of health care practitioners and technical workers (eg, physician, dentist, nurse, pharmacist, physical therapist, respiratory therapist) reported experiencing 3 or more symptoms of posttraumatic stress. Personal care and service frontline workers had 4.3 times the

odds of reporting elevated symptoms of posttraumatic stress than workers in non-frontline jobs.

Among the public health workforce, differences in levels of PTSS existed on the basis of organization setting and size (PH WINS sample). For example, symptoms of elevated posttraumatic stress were more prevalent among those working in Big Cities Health Coalition (BCHC) health agencies (28.2%) than those working in state health agencies (24.3%) and other local governmental public health agencies (23%). Public health workers in BCHC health agencies had 1.24 times the odds of reporting PTSS compared with state health agency workers. Finally, public health workers serving populations above 250 000 reported higher levels of PTSS than workers serving populations below 250 000, but these differences were not statistically significant in logistic regression models.

## **Discussion and Conclusion**

Our study found that the state and local governmental public health agency workforce was more likely to report PTSS than the general adult population, due potentially to the stressors of responding to the COVID-19 pandemic professionally. More than a quarter of the governmental public health workforce and 21.2% of the US adult population reported 3 or more symptoms of posttraumatic stress related to the COVID-19 pandemic in spring of 2021 ( $P < .05$ ). The public health workforce (PH WINS sample) and personal care and service workers (eg, childcare worker, barber, manicurist, fitness trainer, skincare specialist, gaming service worker) in frontline jobs (CLIMB sample) reported higher levels of PTSS than other employed persons in the general population.

Trends in both samples followed similar patterns, with a higher prevalence of reported PTSS among women, young persons, and supervisors, although the differences were not statistically significant for groups in the general population (CLIMB sample). One interesting divergence is that, in the general population, income had an inverse relationship with PTSS. While higher income was associated with lower odds of PTSS in the US general population, it was associated with higher odds of PTSS in the US public health workforce. Thus, the prevalence of PTSS among the public health workforce increased as annualized salary increased, potentially due to greater responsibilities—and stressors—of more senior public health officials that may undercut the mental health benefits of having higher income. Like previous literature, our study reveals high levels of PTSS, especially among those most involved with responding to and exposed to the COVID-19 virus.<sup>2-5</sup> For example, in a study of health care workers during the peak

of COVID-19 inpatient admissions, more than half (57%) of health care workers reported symptoms of acute stress.<sup>5</sup>

This article is not without limitations. Both PH WINS and CLIMB measured symptoms of post-traumatic stress using a screening instrument<sup>20</sup>; a diagnosis of PTSD would need to come from a provider. However, the screener has been validated to have high consistency with true diagnoses at higher cutoffs and allowed us to document mental health at scale. In addition, health care worker status for the CLIMB study was collected in March-April 2020 and PTSS were reported in 2021; it is possible that participants who were health care workers in 2020 left the health care industry between wave 1 and wave 2 of the CLIMB study, given high turnover,<sup>21</sup> leading to potential misclassification of PTSS among health care workers. However, given that this article aimed to understand how working in public health, health care, and adjacent fields was associated with symptoms of posttraumatic stress, we think it is appropriate to include the exposure of 2020 health care worker status. In addition, our article does not explore the prevalence of PTSS qualitatively. Thus, we are unable to provide additional context or specifics regarding the experiences that may have led to respondents reporting PTSS. We believe there are many possible COVID-19–related experiences that respondents could have endured that may have influenced levels of PTSS. For example, both CLIMB and PH WINS respondents may have experienced the death of a loved one due to COVID-19.<sup>22</sup> Governmental public health staff, frontline workers, and health care workers may have experienced increased levels of COVID-19–related workplace harassment<sup>23</sup> or insufficient access to personal protective equipment.<sup>7</sup> More qualitative research is needed to provide additional information on experiences that may have occurred. Finally, the CLIMB study is a nationally representative study of all US adults, which include public health workers. Because of data limitations, we were unable to separate public health workers (separate from health care workers) from other workers; thus, some of the burden of PTSS reported by the US adult population may be reported by public health workers in the CLIMB study. In this way, we provide a conservative estimate of the differences in reporting of PTSS between the 2 groups, as the difference in PTSS between public health workers and non–public health workers may be larger.

PH WINS remains the largest and only nationally representative survey of the governmental public health workforce. This study reveals high levels of COVID-19–related PTSS within the US population

and the US public health workforce, with almost one-fourth of the public health workforce reporting experiencing 3 or more symptoms of posttraumatic stress. Despite the COVID-19 emergency declaration expiring in May 2023, the mental health effects of the pandemic on the public health workforce remain.<sup>24</sup> Given significant departures in the governmental public health workforce during the pandemic,<sup>25</sup> workforce planning will need to account for the impact of mental health on workforce size during pandemics and how staff departures could exacerbate mental health challenges. Mental health assessments, treatment, and recovery will need to be a part of preparedness planning moving forward. In addition, public health and health care leaders should invest in systems-level interventions to promote a healthy workplace environment and culture. Considerations to improve working environments could include prioritizing appropriate and flexible staffing plans and implementing policies that encourage staff to operate as teams.<sup>26</sup> Addressing and elevating the mental health of the public health workforce will be one step in ensuring a robust response to future large-scale events.

### Implications for Policy & Practice

- The governmental public health workforce and frontline workers reported a higher prevalence of COVID-19–related PTSS than other US adults.
- Policymakers and leaders in public health should be aware of and address the potential long-term consequences of post-traumatic stress experienced during the COVID-19 pandemic by the general public and by the public health workforce in particular.
- Persons at a greater risk for PTSS should be targeted for preventive screening and intervention to prevent poor mental health from getting worse and to support the workers who support public health responses to large-scale crises.
- Mental health assessment, treatment, and recovery for the governmental public health workforce, health care workforce, and frontline workers will need to be part of the preparedness planning moving forward.
- Public health and health care leaders should invest in systems-level interventions to promote a healthy workplace environment and culture.
- The mental health effects of the pandemic on the state and local governmental public health workforce remain and require vigilance to ensure the country is well suited to address the next public health crisis.

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