

# Frontline Nurses' Post-Traumatic Stress Disorder and Associated Predictive Factors During the Second Wave of COVID-19 in Central, Uganda

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**Background:** Prior to the COVID-19 pandemic, the Ugandan healthcare system was already under severe strain due to a lack of human resources, poor working conditions, and poor management. At the center of these challenges are nurses, the backbone of the health system. This study investigated post-traumatic stress disorder and associated predictive factors during the second wave of COVID-19 among frontline nurses in the country.

**Participants and Methods:** This was a hospital-based cross-sectional study conducted among 601 nurses between May and June 2021. Post-traumatic stress disorder was assessed using PTSD Checklist-Civilian. The bivariate and multivariate logistic regression analyses were conducted to determine the factors predicting PTSD. P-values less than 0.05 were considered statistically significant at 95% CI.

**Results:** The estimated prevalence of post-traumatic stress disorder was 65.7%. In the multivariate logistic regression, the predictive factors of PTSD among the study participants were social support (AOR: 0.49; 95% CI: 0.34–0.60;  $p \leq 0.001$ ), fear of getting infected with COVID-19 (AOR: 3.10; 95% CI: 2.17–4.43;  $p < 0.001$ ) and increased workload (AOR: 1.65; 95% CI: 1.16–2.34;  $p < 0.001$ ).

**Conclusion:** The results of the study highlight the impact of COVID-19 on the mental health of front-line nurses. Assessing PTSD among nurses may increase the understanding of COVID-19 induced mental health issues. Identifying the risk factors like lack of social support and heavy workload and providing treatment is essential given that various waves of COVID-19 seem inevitable. Supportive strategies like counseling should be provided to the nurses to prevent or manage PTSD.

**Keywords:** frontline nurses, post-traumatic stress, COVID-19, Uganda

## Introduction

The year 2019 was overshadowed by the outbreak of COVID-19 and its effects have rapidly spread to all parts of the world. COVID-19 is a serious global health concern costing the lives of many people.<sup>1</sup> At the frontline of pandemic prevention and treatment, nurses not only shoulder the heavy burden of fighting the pandemic, but they also potentially face enormous risks of infections and death.<sup>2</sup> As a result of multiple stressors, nurses are susceptible to mental health problems.<sup>3</sup> In Uganda, the health worker density is only 0.71 indicating a huge shortage in care.<sup>4</sup> Such a dilemma coupled with other diseases like HIV, malaria, and lower respiratory infections have put the healthcare system in the country at greater risk of collapse.<sup>4</sup> The onset of the second wave of COVID-19 poses an even greater threat on the

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healthcare system particularly the frontline nurses providing direct care to COVID-19 patients.<sup>5</sup> The frontline nurses are at increasing their risk of mental health problems including depression, anxiety, burnout, and post-traumatic stress disorder (PTSD).<sup>6</sup> While previous studies suggest that mental health should be paid attention in healthcare professionals,<sup>7</sup> the prevalence of PTSD among nurses in Uganda remains unknown.

PTSD is a psychological state of imbalance whose characteristic signs and symptoms result from the precipitating traumatic materials fall into intrusion symptoms, avoidance, negative alterations in mood and, heightened arousal.<sup>8</sup> According to the Diagnostic and Statistical Manual of Psychiatric Disorders fifth edition (DSM-5), the full clinical symptoms must be present for more than one month and the disturbance must cause clinically significant impairment in occupational, social, and other important aspects of functioning.<sup>8</sup> Studies examining PTSD in nurses indicate that PTSD is detrimental to the nurses' wellbeing, nursing retention, and quality of patient care.<sup>9</sup> The healthcare professionals typically are exposed to both direct trauma (like workplace violence or personal involvement in traumatic events) and indirect trauma (like caring for dying patients or witnessing the agony of others).<sup>10</sup> In the current study traumatic event refers to nurses, exposure to COVID-19 related aspects. Psychological stressors related to COVID-19 have tested nurses' resilience. The pandemic can be classified as a traumatic event of unprecedented magnitude that surpasses the range of human normal experience with exposure to the risk of death.<sup>11</sup> Given the present concern with the COVID-19 pandemic, evidence is needed to allow policymakers to enact guidance for protecting healthcare professionals.

Prior studies assessing the impact of the pandemics indicated that nurses who perceived risks for their health quit their jobs.<sup>12</sup> However, those who remained developed mental health issues including depression, suicide, and PTSD.<sup>13</sup> In the context of COVID-19, studies indicate that nurses experienced fear, worries for personal safety, and anxiety.<sup>14</sup> In a study conducted in China, results showed that 36.2% of nurses had clinical PTSD symptoms.<sup>15</sup> A study by Xiao et al<sup>16</sup> showed that healthcare professionals working in an environment exposed to COVID-19 were almost 3 times more likely to report PTSD symptoms compared to those not exposed. Studies show that the risk factors for PTSD included gender, age, working experience, working in an unsafe environment,

fear of being infected, social support, and lack of training.<sup>17,18</sup> However, the pandemic is dynamic across nations with different healthcare systems. It is vital to assess psychological distress among healthcare professionals and nurses in particular in different regions at different stages of the pandemic.<sup>19</sup> There is a need for proof to assess the magnitude of psychological distress among healthcare professionals and significantly identify the risk factors.<sup>19</sup>

Uganda recorded its first case of COVID-19 on March 22nd, 2020. Since then, the number of fatalities related to the COVID-19 pandemic continues to rise. Before the COVID-19 pandemic, the Ugandan healthcare system was already under severe strain due to a lack of human resources, poor working conditions, and poor management.<sup>20</sup> At the center of these challenges are nurses, the backbone of the health system and the first point of call for patients. COVID-19 pandemic may have worsened the situation in the country. Frontline nurses have been faced with unprecedented demands to manage the pandemic with unclear etiology, high mortality rate, and no cure. Prior studies indicated that health workers were under serious psychological stress as a result of COVID-19.<sup>4,6</sup> Remarkably, little is known about the burden of PTSD and its predictive factors among nurses in Uganda during the COVID-19 pandemic. Therefore, the current study assessed the prevalence and predictive factors of PTSD in nurses during COVID-19 in central Uganda.

## Materials and Methods

### Study Design and Setting

A cross-sectional method study design was employed in one survey covering nurses registered with the Uganda Nurses and Midwives Council (UNMC) from different health centers in Central Uganda. The study was conducted in two referral and seven general hospitals in central Uganda between May and June 2021. These are reception centers and care for COVID-19 patients in central Uganda. The central region is the epicenter of the COVID-19 pandemic with the highest cases of infections, deaths, and recovery.<sup>20</sup> The nurses in the region may be working with critical patients and thus susceptible to PTSD.

### Study Participants and Sample Size Estimation

A simple random sampling technique was employed to select the required sample. The sample size was calculated

using a single population proportion formula with the assumption of a 36% prevalence of PTSD from a systematic review of PTSD among healthcare workers.<sup>21</sup> Thus  $p = 0.36$ ,  $Z = 1.96$  and the margin of error ( $e$ ) was 0.04. A 10% allowance for non-response was added leading to a total sample size of 636 participants.

## Data Collection Instruments

We used a self-administered questionnaire to collect data from the nurses across the six health facilities. We also captured demographic and workplace contextual factors conceptualized predicting PTSD. We used the validated PTSD Checklist-Civilian (PCL-C) which has been used to assess PTSD symptoms among healthcare professionals in different countries.<sup>22</sup> PCL-C was developed by the American PTSD research center following the Diagnostic and Statistical Manual of Mental Disorders.<sup>23</sup> PCL-C has 17 self-report items which are categorized into three dimensions, avoidance, re-experiencing, and hyperarousal on a 5-point Likert scale of 1 to 5. These dimensions correspond to the DSM-5 symptoms criteria for PTSD.<sup>5</sup> According to the PCL-C scale, the lowest score is 17 and the highest score is 85 with a higher score indicating a higher risk for PTSD.<sup>23</sup> A score  $\geq 45$  indicates the presence of PTSD.<sup>24</sup> In this study, the traumatic event was replaced by the COVID-19 pandemic. In this study, the Cronbach's alpha for PCL-C was 0.86.

## Procedure

Study data were collected between May and June 2021 during the second wave of COVID-19. The eligibility criteria required participants to be registered nurses working in central Uganda. One referral and seven general hospitals agreed to participate in this study. This was after initial contact with hospital administration officers in Kampala, Uganda. Following the approval of the research protocol, potential participants were identified, informed about the purpose of the study, the right to voluntary withdraws if appropriate, and asked to participate after signing the written consent forms. Eligible participants were randomly enrolled in the study until the desired sample was realized. Nurses who were busy and/or attending to critically ill patients at the time of data collection were excluded from the study. The nurses who volunteered completed the informed consent and questionnaires and the exercise took about 22 minutes to complete.

## Statistical Analysis

Data were analyzed using SPSS version 25.0. Every questionnaire was checked for completeness at the end of each interview. A data entry screen was created in SPSS version 23 with checks to ensure accuracy during entry. Data were scanned for out-of-range and missing values before commencing data analysis. We accounted for missing data by using a full information maximum likelihood estimation with robust standard errors to prevent sample size reduction and loss of statistical power.<sup>25</sup> Descriptive data were summarized using tables. Binary and multivariable logistic regression analysis was conducted to determine potential risk factors for PTSD. The effects of the independent variables were expressed as odds ratio (OR) and associated 95% confidence intervals (CI). The outcome variable of the study was PTSD transformed into a dichotomous variable of low ( $\leq 44$  scores) and high ( $\geq 45$  scores) as per the PCL-C manual.<sup>26</sup>

## Ethical Approval and Consent to Participation

This study was conducted in accordance with the Declaration of Helsinki. This study was approved by the Egerton University Research and Ethics Committee Institutional Review Board (EG-REC-0271). Participants in this study were recruited based on written informed consent and confidentiality was maintained throughout the entire research protocol process. The study was anonymous and participants had the right to withdraw at any time.

## Results

### Demographic Characteristics and Prevalence of Post-Traumatic Stress Disorder Among Nurses

A total of 601 participants were included in the study with a response rate of 94.4% and their characteristics are presented in Table 1. The results indicate that 60.4% ( $n = 364$ ) were female, 54.6% ( $n = 382$ ) were aged 30 years and above, 55.6% ( $n = 328$ ) had education level of above a diploma, 56.4% ( $n = 308$ ) were married and 51.2% ( $n = 308$ ) had worked for over 5 years. In this study (Table 1), the estimated prevalence was higher among females (65.7%), young (56.4%), above diploma education (62.5%), married (63.1%), and less experienced (65.2%).

**Table 1** Demographic Information and Prevalence of Post-Traumatic Stress Disorder Among Nurses

Explanatory Variables	Frequency (%)	Post-Traumatic Stress Disorder		Total (%)
		No =44 (n %)	≥45 Yes (n %)	
<b>PTSD</b>		230 (38.3)	371 (61.7)	601 (100.0)
<b>Gender</b>				
Male	237 (39.4%)	105 (44.3)	132 (55.7)	237 (100.0)
Female	364 (60.6%)	125 (34.3)	239 (65.7)	364 (100.0)
<b>Age</b>				
<30 years	273 (45.4%)	87 (31.9)	186 (68.1)	273 (100.0)
>30 years	328 (54.6%)	143 (43.6)	185 (56.4)	328 (100.0)
<b>Education levels</b>				
<Diploma	334 (55.6%)	130 (38.9)	204 (61.1)	334 (100.0)
>Diploma	267 (44.4%)	100 (37.5)	167 (62.5)	267 (100.0)
<b>Marital status</b>				
Single	262 (43.6%)	105 (40.1)	157 (59.9)	262 (100.0)
Married	339 (56.4%)	125 (36.9)	214 (63.1)	339 (100.0)
<b>Work experience</b>				
5 years	293 (48.8%)	102 (34.8)	195 (65.2)	293 (100.0)
>5 years	308 (51.2%)	125 (41.6)	180 (58.4)	308 (100.0)

## Multivariable Logistic Regression Analysis

In the regression model, we included the demographic variables along with the factors as the independent variables. The factors of interest including social support, fear of infection, workload, economic concern, and others were investigated while the potential confounders (demographic variables) were held constant. After controlling for confounding in the multivariate logistic regression in Table 2, the factors that independently predicted PTSD among the study participants were; lack of social support (AOR: 0.49;

95% CI: 0.34–0.60;  $p \leq 0.001$ ), fear of getting infected with COVID-19 (AOR: 3.10; 95% CI: 2.17–4.43;  $p < 0.001$ ) and increased workload (AOR: 1.65; 95% CI: 1.16–2.34;  $p < 0.001$ ).

## Discussion

The current study assessed the prevalence and predictive factors of PTSD in nurses during COVID-19 in central Uganda. In this study, 61.7% of the frontline nurses reported PTSD. This result is not surprising because the

**Table 2** Multivariable Logistic Regression Analysis of Predictors of PTSD Among Nurses in Central Uganda (n=601)

Category	PTSD		COR 95% CI	AOR 95% CI	p-value
	No (n %)	Yes (n %)			
<b>Social support</b>					
Yes	146 (44.6)	181 (55.4)	0.55 (0.39–0.77)	0.49 (0.34–0.60)	>0.001*
No	84 (30.7)	190 (69.3)	1.00	1.00	
<b>Fear of getting infected with COVID-19</b>					
Yes	82 (26.3)	230 (73.7)	0.94 (2.09–4.14)	3.10 (2.17–4.43)	>0.001*
No	148 (51.2)	141 (48.8)	1.00	1.00	
<b>Increased workload</b>					
Yes	107 (31.6)	232 (68.4)	1.91 (1.92–2.68)	1.65 (1.16–2.34)	0.005*
No	123 (46.9)	139 (53.1)	1.00	1.00	

Notes: \*Statistically significant variables at  $p < 0.05$ . 1.00: Reference category.

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio.

psychological stressors related to COVID-19 have tested nurses' resilience. The pandemic can be classified as a traumatic event of unprecedented magnitude that surpasses the range of human normal experience with exposure to the risk of death.<sup>11</sup> This view is supported by Xiao et al,<sup>16</sup> that healthcare professionals working in an environment exposed to COVID-19 were almost 3 times more likely to report PTSD symptoms compared to those not exposed. Data were collected during the second wave of the pandemic where there were an increased percentage of patient deaths which may have resulted in increased exposure to psychological distress. Studies have shown that nurses and midwives were more likely to experience PTSD compared with healthcare professionals.<sup>19</sup> The 61.7% of nurses experiencing PTSD observed in this study, is higher than 22.8% in Korea,<sup>27</sup> 35.21%,<sup>28</sup> in China and 57% in the United Kingdom.<sup>19</sup> The higher prevalence of PTSD in this study is understandable. Although the healthcare system in Uganda has greatly improved in the wake of the COVID-19 pandemic, and the ministry of health has put in place basic principles and guidelines to flatten the curve, the mental health care for the frontline nurses has been under-addressed. Also, limited psychological policies for nurses or other health workers are available. Given the numerous stressors faced by the nurses globally and particularly in Uganda amidst the ailing healthcare system, it is important to identify the risk factors for PTSD and the needs of nurses to inform support interventions for mental healthcare nurses during pandemics.

Our results revealed that nurses who had social support were 49% times less likely to experience PTSD compared to their colleagues who lacked social support. Our findings suggest that social support is a predictive factor for PTSD. Social support is a relevant resource that determines the quality of life and wellbeing of nurses.<sup>29</sup> Substantial research has indicated that social support can ameliorate the negative impact of mental health issues.<sup>30</sup> As predicted in our study, studies show that lack of social support predicted high levels of PTSD among health care professionals.<sup>31</sup> The finding is also consistent with previous studies indicating that social support is an important buffering factor of negative psychological health among healthcare professionals.<sup>32</sup> Consequently, several studies underscore the need for establishing programs to give healthcare professionals social support as an essential component.<sup>33</sup>

Our results showed that nurses who feared getting infected with COVID-19 reported higher PCL-C scores than their counterparts who did not have the fear. They were two times more likely to experience PTSD compared to less worried nurses. This finding shows the overarching concern for personal safety which is echoed through other studies.<sup>34</sup> The limited supplies of PPE in the hospitals may be the source of this concern for nurses. Additionally, nurses were trained to practice evidence-based healthcare. However, COVID-19 is novel without guidelines or protocols of best practices which creates a space for susceptibility for the nurses. Statistics show that many healthcare professionals including nurses have so far been infected while interacting with their patients.<sup>35</sup> In the context of an infectious diseases outbreak, healthcare professionals have fears of being infected.<sup>36</sup> Therefore, the impending threat of a continued wave of infected nurses affects the mental health of these nurses. In agreement with this result, studies have shown that not worrying about infection was a protective factor for PTSD.<sup>37</sup> Increased fear of being infected with COVID-19 was found as a significant risk factor for PTSD.<sup>31</sup>

The results of the present study indicated that nurses who had increased workload were more likely to experience PTSD compared to their colleagues who had less workload. Prior studies assessing the impact of the pandemics indicated that nurses who perceived risks for their health quit their jobs.<sup>12</sup> However, those who remained were not only exposed by the pandemic to the distress but had increased workload.<sup>14</sup> In the Ugandan context, before the COVID-19 outbreak, the health system was already under severe pressure due to a shortage of human resources and multiple disease burdens. However, this situation was exacerbated by high COVID-19 infections and subsequent deaths. These results tandem with literature that emphasized an increased workload during the pandemics and predicted PTSD.<sup>38</sup> Also in line with the results of the present study, the literature indicates that the more the patients in the nurses' care, the higher the risk for PTSD.<sup>39</sup>

## Strength and Limitations of the Study

The results of this study aimed at providing clarity regarding the prevalence and the predictive factors of PTSD in resource strained countries. The predictors are lack of social support, heavy workload and fear of getting infected with COVID-19. However, the researcher is unable to infer

causality from the observed correlation due to the cross-sectional design used in the study. The study also used self-report questionnaires with the possibility of recall bias in the results. The exclusion of the busy nurses or those attending to the critical needs of the patients may have skewed the results. The data in this study represent nurses from a limited range of geographic locations and may not be generalizable. Additional research is needed to expand and clarify the present results of PTSD in nurses in Uganda.

## Conclusion

The study conducted in central Uganda found that many frontline nurses screened positive for PTSD highlighting the impact of COVID-19 on the healthcare system. Self-reported risk for PTSD mainly centered on lack of social support, fear of getting infected with COVID-19, and heavy workload. Supportive strategies like counseling should be provided to the nurses to prevent or manage PTSD.

## Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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## Author Contributions

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

## Disclosure

The authors declared that there are no competing interests in this work.

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