

# Factors Associated with Burnout among Chinese Nurses during COVID-19 Epidemic: a cross-sectional study

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## Research article

**Keywords:** burnout, anxiety, nurses, COVID-19

**Posted Date:** June 9th, 2020

**DOI:** <https://doi.org/10.21203/rs.3.rs-31486/v1>

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**Version of Record:** A version of this preprint was published at BMC Nursing on February 28th, 2022. See the published version at <https://doi.org/10.1186/s12912-022-00831-3>.

# Abstract

**Background:** The COVID-19 epidemic has been outbreak and even spread to the global. The whole medical system in the world is facing great challenges. As one of the main forces, nursing staff are at the highest risk. Their negative emotions and job burnout are worthy of attention. This study aims to investigate the status of burnout and anxiety among nurses during COVID-19 epidemic and analyze the influencing factors of burnout.

**Methods:** A cross-sectional survey was conducted from February 19 to February 25, 2020. A total of 1011 nurses from Wuhan tertiary hospitals were distributed with the basic information questionnaire, Maslach Burnout Inventory - General Survey (MBI-GS) and State-Trait anxiety inventory (STAI). The number of final valid questionnaire was 885. The effective recovery rate was 87.5%. Linear regression analysis was performed to explore the influencing factors.

**Results:** The mean score of three dimensions of MBI-GS was 11.50, 6.02, 24.47, respectively. The mean score of state anxiety was 45.52 and trait anxiety, 43.78. Anxiety was positively related to emotional exhaustion and cynicism, and negatively to personal accomplishment. The positive factors of burnout were personnel agency, 5 years or less work experience, living in hospital dormitory, Wuhan medical team, working more than 9 hours, and the best level of knowledge of COVID-19. And having no siblings, intermediate title, working in isolation wards, 3 and more night shifts per week, living in hotels, and having confirmed or suspected medical staff around were negative factors.

**Conclusions:** From this study, the anxiety level among nurses during the COVID-19 is serious, however, the level of burnout is mild to medium. Managers should continue to pay attention to the negative emotions of nurses and related factors, and take interventions timely to stabilize the nursing team.

## Background

In December 2019, Novel coronavirus pneumonia began to occur in Wuhan city, Hubei Province of China, as the epicenter. With the development of the epidemic, it has spread around the world. As of April 8, 211 countries and territories have reported cases of coronavirus disease 2019 (COVID-19), and global cumulative confirmed and death cases were up to 1353361, 79235, respectively[1]. The virus is posing a serious threat to global health and economic development.

Since the outbreak of COVID-19 epidemic, the leaders of the Chinese national and local governments have collaborated together to take a series of effective prevention and control measures. The pneumonia caused by novel coronavirus infection has been classified into class B management of notifiable infectious diseases and adopted prevention and control measures for class A by the National Health Commission of the People's Republic of China[2]. On January 23, Wuhan City's COVID-19 Epidemic Prevention and Control Command issued that the whole city's traffic was suspended to cut off the transmission route [3].

As an influential treatment position, hospitals play an irreplaceable role in the epidemic response and prevention. As of February 28, more than 90 national-level and provincial-level medical teams, about 13,000 high-level health-care workers were gathered in Wuhan to collaborate with local medical staff to treat patients jointly [4]. Healthcare workers, especially the “front line” medical caregivers, witness the pain and suffering of the patients in their daily work [5]. They wear heavy personal protective equipment (PPE) and perform tedious and detailed nursing work for confirmed patients in isolated areas. In addition, they had higher exposure to be infected with the virus than others. Considering the possibility of bringing the virus to families and traffic restrictions, the majority of the medical staff couldn't return home, and had to live in hospital dormitories and hotels. Confronted by such high-intensity psychological pressure and workload, not only will they have mental health problems such as depression and anxiety [6], but also fatigue, burnout, and even the consideration of leaving a job [7–8].

Burnout was a psychological state resulting from chronic emotional or psychological stress [9]. It was characterized by Maslach as emotional exhaustion (the state of being emotionally drained), depersonalization (the loss of compassion and concern), and a decreased sense of personal accomplishment at work [10–11]. On May 28, 2019, the World Health Organization (WHO) declared in the 11th revision of the International Classification of Diseases (ICD-11) that burnout is a “professional phenomenon”, and it is a syndrome caused by “chronic workspace stress that has not been successfully managed” [12]. Studies show that burnout is related to a series of self-reported physical and psychological stress indicators such as anxiety and depression [13], fatigue [14].

This situation should be taken seriously. Some studies informed that the level of burnout may relate to the units where nurses worked [15–17], hence the need to analyse the impact of work areas on nurses' burnout levels in this special period. Therefore, the objectives of this study were to investigate the status of burnout among nurses and its influencing factors during COVID-19 epidemic to provide intervention decisions for managers.

## Methods

### Design

Multi-center, descriptive, cross-sectional survey was used.

### Participants

The study was conducted between February 19 2020 and February 25 for which self-evaluated questionnaires in an anonymous online way were distributed to 1011 nurses. Participants worked in Wuhan tertiary hospitals for at least one week since the epidemic outbreak. They were informed about the purpose. Their participation was interpreted as informed consent and were assured that all data were kept confidential. The number of final valid questionnaires was 885, and the effective recovery rate was 87.5%.

# Questionnaire

## Social-demographic and work-related data collection sheet

The social-demographic and work-related data collection sheet included sex (female, male), age, marital status (single, married, other), no siblings (yes, no), number of children (0, 1, 2,  $\geq 3$ ), educational level, technical tile, medical team (Wuhan, others), employment status (regular payroll, personnel agency, contract worker, hiring), work experience (years), current units (fever clinics, isolation ward, common ward), hours of daily work, number of night shifts weekly, dwelling place (hospital dormitory, hotel, home, other), knowledge level of COVID-19 (best, better, general, weak), confirmed or suspected medical staff around (yes, no).

## Maslach Burnout Inventory - General Survey (MBI-GS)

The MBI-GS was used to measure burnout [10]. The Chinese version of MBI-GS was revised by Li et al [18], and its validity was verified [19]. The 15-item questionnaire contains 5 questions on emotional exhaustion, 4 on cynicism and 6 on personal accomplishment. Each item is a self-reported question made up of a 7-point scale (0–6 points from “never” to “every day”). The higher score of emotional exhaustion and cynicism is, the higher degree of burnout will be,

while the score in personal accomplishment is opposite. In this study, the Cronbach's  $\alpha$  of the MBI-GS was 0.854. The Cronbach's  $\alpha$  for three dimensions were 0.957, 0.929, 0.936, respectively.

## State-trait anxiety inventory (STAI)

The State-Trait Anxiety Inventory (STAI) was used to evaluate anxiety [20]. This measure includes two subscales: State Anxiety Inventory (SAI) and Trait Anxiety Inventory (TAI). The TAI reflects the relatively stable aspects of “anxiety proneness”, while the SAI evaluates the current state of anxiety; that is, the current feelings “at this moment” [21]. It consists of 40 items with each item scored on a 4-point scale (1–4 points), with 20 items for each subscale. Range of total score is 20–80. The higher score indicating greater anxiety. It had better reliability and validity [21–22]. In our study, the Cronbach's  $\alpha$  of SAI was 0.925.

## Statistical analysis

The data were initially subjected to descriptive analysis. All data were shown as number (N),

Percentage (%), Mean, and standard deviation (SD). Multivariate Linear Regression analysis with the stepwise method was utilized to detect independent factors associated with anxiety and burnout.

Correlation between burnout and anxiety was calculated with the Pearson correlation. All data analyses were performed using SPSS 19.0. A two-tailed  $P < 0.05$  was identified as significant.

## Results

### **Social-demographic and work-related situations of participants**

The mean age of participants was 30.96 (SD = 6.10) years, ranging from 20 to 53 years of age. The majority of participants were female (96%), married (61.6). 71.5% of participants had no siblings. 42.1% had no children. 86.8% had an undergraduate degree or above. 69.3% had the junior title. Most were from other regional medical teams (61.6%), and 38.4% were Wuhan's. The majority (65.9%) were contract workers. During the epidemic, 5.8% work in the fever clinics, 82.4% in isolation wards, and 11.9% in general wards. Their most daily work hours were 5 ~ 8 h (79.1%). 85.6% had one night shift per week at least. Their dwelling places during the epidemic were hospital dormitory (30.2%), hotel (49.8%), home (15.6%) and other (4.4%). Their levels of knowledge of COVID-19 were best (14.6%), better (64.7%), general (20.1%) and weak (0.6%). 61.5% had confirmed or suspected medical staff around themselves. (Table 1.)

Table 1  
Social-demographic and work-related situations of participants [N(%)]

Variables	Mean (SD)	N (%)
Sex		35(4.0)
Male		850(96.0)
Female		
Age	30.96 (6.10)	
Marital status		326(36.8)
Single		545(61.6)
Married		14(1.6)
Divorced/widow		
No siblings		252(28.5)
Yes		633(71.5)
No		
N of Children		373(42.1)
0		404(45.6)
1		100(11.3)
2		8(0.9)
≥3		
Education level		117(13.2)
College and below		753(85.1)
Undergraduate		15(1.7)
Master and above		
Technical title		613(69.3)
Junior		245(27.7)
Intermediate		27(3.1)
Deputy Senior and above		
Medical team		340(38.4)
Wuhan		545(61.6)
Others		

<b>Variables</b>	<b>Mean (SD)</b>	<b>N (%)</b>
Employment status		114(12.9)
Regular payroll		113(12.8)
Personnel agency		583(65.9)
Contract worker		75(8.5)
Hiring		
Work experience, y		290(32.8)
< 5		311(35.1)
5 ~ 10		203(22.9)
11 ~ 20		81(9.2)
>20		
Current unit		51(5.8)
Fever clinics		729(82.4)
Isolation ward		105(11.9)
General ward		
Hours of daily work		86(9.7)
≤ 4		700(79.1)
5 ~ 8		99(11.2)
≥ 9		
N of night shifts weekly		127(14.4)
0		120(13.6)
1		431(48.7)
2		207(23.4)
≥3		
Dwelling place		267(30.2)
Hospital dormitory		441(49.8)
Hotel		138(15.6)
Home		39(4.4)
Other		

Variables	Mean (SD)	N (%)
Knowledge level of COVID-19		129(14.6)
Best		573(64.7)
Better		178(20.1)
General		5(0.6)
Weak		
confirmed or suspected medical staff around		544(61.5)
Yes		341(38.5)
No		

## The Descriptive Statistics Of Burnout And Anxiety Scales

The potential range score, mean values, standard deviations (SD) as well as the lowest and highest score of the subscales are presented in Table 2.

Table 2  
The descriptive statistics of burnout and anxiety scales (n = 885)

	Range	Lowest score	Highest score	Mean	SD
SAI	20–80	20	78	45.52	10.50
TAI	20–80	20	78	43.78	9.86
Emotional exhaustion	0–30	0	30	11.50	7.51
Cynicism	0–24	0	24	6.02	5.58
Personal accomplishment	0–36	0	36	24.47	9.53

## Correlation Between Burnout And Anxiety

The linear correlation between burnout scales and the anxiety scores was determined in Table 3. The emotional exhaustion scale presented statistically significant correlations with SAI and TAI scores. Statistically significant relationships were observed between cynicism and SAI and TAI items. Similarly significant correlations were found between personal accomplishment and SAI and TAI scores. There were significant positive correlations between emotional exhaustion and cynicism, while there was no significant correlation with personal accomplishment. Cynicism was negatively correlated with personal accomplishment (Table 3).

Table 3  
Correlation coefficients between burnout and anxiety (N = 885)

	SAI	TAI	EE	C	PA
SAI	1	0.883**	0.553**	0.494**	-0.275**
TAI		1	0.605**	0.547**	-0.319**
EE			1	0.729**	-0.042
C				1	-2.18**
PA					1
**P < 0.01					
EE- Emotional exhaustion, C- Cynicism, PA-Personal accomplishment.					

## Factors Associated With Burnout

Multiple linear regression analysis was compiled for each dimension of burnout scale. For emotional exhaustion, the variables personnel agency ( $\beta = -2.01$ ,  $P < 0.01$ ), 5 years or less working experience ( $\beta = -1.75$ ,  $P = 0.001$ ), living in hospital dormitory ( $\beta = -1.86$ ,  $P = 0.001$ ), 3 or more night shifts weekly ( $\beta = 2.43$ ,  $P < 0.001$ ), the best ( $\beta = -3.24$ ,  $P < 0.001$ ) and better ( $\beta = -1.25$ ,  $P < 0.05$ ) level of knowledge of COVID-19, and having confirmed or suspected medical staff around ( $\beta = 2.05$ ,  $P < 0.001$ ) were statistically significant predictors. For cynicism, the variables intermediate tile ( $\beta = 1.21$ ,  $P < 0.01$ ), personnel agency ( $\beta = -1.72$ ,  $P < 0.01$ ), working in isolation ward ( $\beta = 1.04$ ,  $P < 0.05$ ), living in hospital dormitory ( $\beta = -1.31$ ,  $P = 0.001$ ), 3 or more night shifts weekly ( $\beta = 2.10$ ,  $P < 0.001$ ), the best level of knowledge of COVID-19 ( $\beta = -1.83$ ,  $P < 0.001$ ), and having confirmed or suspected medical staff around ( $\beta = 1.71$ ,  $P < 0.001$ ) were predictors. Finally, for personal accomplishment, no siblings ( $\beta = -1.73$ ,  $P < 0.05$ ), Wuhan medical team ( $\beta = 1.37$ ,  $P < 0.05$ ), living in hotel ( $\beta = -1.33$ ,  $P < 0.05$ ), 9 or more hours of daily work ( $\beta = 3.37$ ,  $P = 0.001$ ), the best ( $\beta = 5.67$ ,  $P < 0.001$ ) and better ( $\beta = 2.62$ ,  $P = 0.001$ ) level of knowledge of COVID-19, and having confirmed or suspected medical staff around ( $\beta = -1.68$ ,  $P = 0.01$ ) were predictors (Table 4).

Table 4

Multivariate Linear Regression Analysis with step-wise Methods with burnout subscales as dependent variables (n = 885)

	Emotional exhaustion		Cynicism		Personal accomplishment	
	$\beta$	SE	$\beta$	SE	$\beta$	SE
<b>Social-demographic factors</b>						
No siblings					-1.73*	0.69
Intermediate title			1.21**	0.40		
Personnel agency	-2.01**	0.74	-1.72**	0.55		
<b>Work-related factors</b>						
Work experience < 5 years	-1.75***	0.52				
Wuhan medical team					1.37*	0.69
Isolation ward			1.04*	0.47		
Hospital dormitory	-1.86***	0.54	-1.31***	0.40		
Hotel					-1.33*	0.66
≥ 3 night shifts weekly	2.43***	0.57	2.10***	0.42		
≥ 9 hours of daily work					3.37***	0.99
Knowledge level of COVID-19	-3.24***	0.84	-1.83***	0.51	5.67***	1.07
Best	-1.25*	0.61			2.62***	0.78
Better						
confirmed or suspected medical staff around	2.05***	0.50	1.71***	0.37	-1.68**	0.65
***P < 0.001, **P < 0.01, *P < 0.05						
$\beta$ = Regression Coefficient; SE = Standard Error of the Estimate						

## Discussion

### Anxiety and burnout

STAI was used in the present study as it has already been used in researches targeting health professionals [23–24]. The subscale SAI evaluates the emotional state at a given moment. A previous study considered that the values of 31 to 49 indicated moderate anxiety [25]. This suggested that 90.66% of participants had moderate and above anxiety. The mean scores of SAI and TAI in this study were 45.52

( $\pm 10.50$ ) and  $43.78(\pm 9.86)$ , respectively. A set of norm values were  $38.97 (\pm 8.45)$  and  $41.31 (\pm 7.45)$  [26]. Compared with norms, there were significant difference on both SAI ( $U = 18.54, P < 0.001$ ) and TAI ( $U = 7.46, P < 0.001$ ). The above results reported that nurses had a higher level of anxiety during COVID-19 epidemic.

Mean score ( $\pm$  standard deviation) was  $11.50(\pm 7.51)$ ,  $6.02(\pm 5.58)$ ,  $24.47(\pm 9.53)$  for emotional exhaustion, cynicism, personal accomplishment, respectively. In Ge's study [27], a survey among Chinese community health workers, the results of the MBI-GS for each sub-scales were  $7.20(\pm 5.49)$ ,  $3.55(\pm 4.28)$ ,  $24.41(\pm 10.78)$ . Compared with Ge's results, it can be seen that emotional exhaustion and cynicism were more severe, while personal accomplishment had not statistically significant. In the results of abroad studies, the results were  $9.7(\pm 7.1)$ ,  $6.7(\pm 5.3)$ , and  $28.2(\pm 5.5)$  for the Norwegian population [28], and the results for Korea were  $18.9(\pm 7.1)$ ,  $11.1(\pm 4.9)$ , and  $27.4(\pm 6.4)$  [19]. Compared with the two abroad studies, the score of emotional exhaustion of nurses during COVID-19 were higher than Norwegians, but lower than Koreas, and the level of cynicism and personal accomplishment was lower than theirs. Although different background environments were reflected in each study, it can be seen that the level of burnout of nurses in this study tend to be mild to middle.

This study reports that more anxiety was associated with higher emotional burnout and cynicism, and lower personal accomplishment, which is in agreement with other study [17]. This result highlights that the importance of early identification of the mental state of health care workers and active intervention measures to prevent or reduce occurrence of psychological problems.

It also presents that higher emotional exhaustion reports the higher cynicism reports, lower personal accomplishment, which corroborated an earlier study [29]. Nurses who still work during the epidemic, are faced with great pressure, high requirements and changeability. They often deal with continuous suffering of patients and the medical futility, end of life matters, as well as facing ethical issues [30].

## Factors With Burnout

This study analyzed the level of burnout of nurses working during the COVID-19 epidemic from social-demographic characteristics and work-related factors, based on different dimensions of burnout scale.

## Social-demographic Characteristics

Compared with those who had siblings, nurses with no siblings had lower personal accomplishment. This reason may be the case that the majority of nurses with no siblings were young in this study. They have shorter job tenure and lack of working experience. In addition, the state of patients infected with COVID-19 sometimes changes rapidly, but the nursing function may be limited[17]. On the other hand, the siblings reflect one aspect of social and emotional support [31]. Supports from intimate relationships may increase the enthusiasm of work to a certain extent.

Nurses with intermediate title had a higher level of cynicism. A domestic study showed that nurses with lower technical title were more prone to burnout [32]. This may be due to the fact that in this study, participants with the intermediate title mostly had their own families and children. They worried that they may be virus carriers and take it to their families so that they couldn't go home, even take care of their young children. They concentrated more attention on their families.

Participants' personnel management methods are personnel agents, with low levels of emotional exhaustion and cynicism, which was in line with other studies [33–34]. At present, types of clinical nurse employed in hospitals include regular payroll, personnel agency, contract and temporary employment, of which salary, benefits, title promotion and career prospects are all different. Wages and welfare are the basic life guarantee of clinical nurses. If the basic needs are not met, no incentive mechanism will stimulate and improve nurses' zeal and satisfaction, especially during the epidemic. On February 23, 2020, the national government put forward a series of measures to care for health-care workers, such as increasing remuneration package, implementing first-line personnel life security, and strengthening personal protection, etc [35], to encourage them maintain full energy and concentrate on fighting against the epidemic.

## Work-related Situations

Nurses with 5 or less work experience were found to have lower emotional exhaustion comparing with other longer work experience. The result was different from a previous study during SARS [36], which showed that nurses with shorter tenure were more likely to consider leaving their job. Work experience is often an influencing variable of burnout [17, 37]. Perhaps, in this study, the majority of the participants are "Post-90s". Although most of them were more anxious, they were still enthusiastic and positive work.

Wuhan medical team members had a higher sense of personal accomplishment. Nurses in the epicenter, Wuhan, as a native warrior, have more responsibility and obligation to fight this epidemic, to protect their homeland.

Working in isolation ward was a negative factor of cynicism. Working in isolation wards, on the one hand, nurses had to bear their own physical needs. To save protective materials, they couldn't take off heavy PPE until 4–6 hours at least during which they cannot eat, drink, or go to the toilet. On the other hand, they had to take the risk of being infected extremely, to provide patients with complicated and trivial nursing work and help in life. However, this study reported that the best or better level of knowledge of COVID-19 was a protective factor for the three subscales of burnout. Previous studies had been determined that training and education about the etiology of emerging infectious disease and related infection control measures would increase their knowledge and contribute to positive attitudes regarding their perceived anxiety and personal safety as well as reduce their level of burnout [36, 38]. 79.3% of the participants in this study thought that their knowledge level has reached better or best. Therefore, the training of knowledge and skills of health-care workers who cared for COVID-19 patients is a necessary and active measure.

The number of night shift, especially 3 or more, influences the emotional exhaustion and cynicism, which is consistent with other studies [17, 39]. Shift work is a fundamental element of the continuity of nursing practice. During the initial stage of the epidemic, staff shortage led to shifting work frequently and placed increased pressure on nurses. However, one interesting finding was that nurses who worked more than 9 hours a day had higher personal accomplishment. Although they overwork and have heavy workload, they had a high level of job accomplishment and satisfaction, which was different from previous studies [40–41]. In the special period when the whole country united to fight against the epidemic, they are highly motivated and willing to contribute, which is in line with the traditional national spirit of the Chinese nation.

During the anti-epidemic period, 80% of nurses lived in hospital dormitories and hotels directly. The results showed that living in hospital dormitories was a protective factor for emotional exhaustion and cynicism, while living in hotels had lower personal accomplishment. If they had confirmed or suspected medical staff round themselves, they had higher level of burnout. The findings remind managers to pay attention to the safety of medical staff, and take protective measures and care for them.

## Limitations

This study adopted a cross-sectional survey, which only knew and analyzed the situation at that time. Although longitudinal study is difficult to achieve, it's crucial to further understand the level of burnout of medical staff with the development of the epidemic over time. Participants in the present study were selected on the basis of convenience. In addition, based on the actual situation and literature review, there may be other influencing factors of burnout except for those involved in this study. Further study can be conducted to explore additional factors and follow up to pay attention to psychological dynamics.

## Conclusion

The aim of the present study was to investigate the anxiety and burnout levels of nursing staff during the COVID-19 epidemic, and analyze the related influencing factors of burnout. The results have resulted that the anxiety level of nurses is serious, however, the level of burnout is mild to medium. The influencing factors of burnout were analyzed from the characteristics of social demography and work-related, and finally included 12 variables. For emotional exhaustion, personnel agency, 5 years or less work experience and living in the hospital dormitory are positive factors, 3 and more night shifts a week is a negative factor. Personnel agency, living in hospital dormitory are negative associated with cynicism, while intermediate title and working in isolation ward are positive. For personal accomplishment, the level of nurses of Wuhan medical team and working more than 9 hours per day is higher, and having no siblings and living in hotels are lower. The best level of knowledge of COVID-19 and having confirmed or suspected medical staff around are positive and negative factor, respectively, for three dimensions. Nursing managers should continue to pay more attention to nurses' anxiety and burnout related factors to establish a stable nursing team.

# Abbreviations

COVID-19: coronavirus disease 2019; MBI-GS: Maslach Burnout Inventory - General Survey; STAI: State-Trait anxiety inventory ; SAI: State Anxiety Inventory; TAI: Trait Anxiety Inventory; PPE: personal protective equipment

# Declarations

## Ethics approval and consent to participate

Participants were voluntary and written consent was obtained from all participants before data collection. Name and personal identifiers were not included in the questionnaire. This research was approved by the ethics committee of RenMin Hospital of Wuhan University.

## Consent for publication

Not applicable.

## Availability of data and materials

The data that support the findings of this study are available by request from the authors.

## Competing interests

The authors declare that they have no competing interests.

## Funding

No funding was received to conduct this research.

## Authors' contributions

ZYW assisted with the study, completed the statistical analyses and drafted the manuscript. MFL and HM assisted with the survey and data analyses. ZXC assisted with the survey and participated in the design of the study. YYXY conceived of the study, and participated in its design and coordination and helped to draft the manuscript. All authors read and approved the final manuscript.

## Acknowledgments

The authors would like to thank all the study participants and voice their appreciation of nurses' efforts against COVID-19.

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