

Mental Health Impact of COVID-19 on Quarantine Hotel Employees in China

This article was published in the following Dove Press journal:
Risk Management and Healthcare Policy

Yi-Man Teng^{1,*}
Kun-Shan Wu^{2*}
Kuan-Ling Lin³
Dan Xu¹

¹College of Modern Management, Yango University, Fuzhou 350015, People's Republic of China; ²Department of Business Administration, Tamkang University, Taipei, Taiwan; ³College of Child Development and Education, Yango University, Fuzhou 350015, People's Republic of China

*These authors contributed equally to this work

Background: The COVID-19 pandemic has had a far-reaching and unprecedented influence on economies worldwide. It has also impacted on the global population's mental health and caused negative psychosocial effects, which may lead to psychological crises. During the pandemic, the challenges for quarantine hotel employees are not only the increased workloads created by operating a quarantine hotel but also high psychological stress associated with job insecurity, risk of exposure and contagion for themselves, their friends and families. This research attempts to explore COVID-19-related depression, anxiety, and stress among quarantine hotel employees in China. The mental health of quarantine hotel employees, who have faced unprecedented changes, is paramount while they provide hospitality and care for healthcare workers and quarantine guests during mandatory quarantine periods.

Methods: This is a cross-sectional study that applied convenience sampling to collect questionnaire samples from 170 quarantine hotel employees in Xiamen, Fujian Province, China, during the COVID-19 pandemic, from May 20 to June 10, 2020. The Depression, Anxiety, and Stress Scale (DASS-21) was used to collect data. The study uses descriptive analysis, chi-square test and binary logistic regression to examine the sociodemographic factors associated with depression, anxiety and stress levels during the COVID-19 pandemic.

Results: The results reveal that 43.5% of respondents report moderate to extremely severe symptoms of depression; 68.2% have moderate to extremely severe anxiety symptoms; and 8.2% indicated moderate to extremely severe stress symptoms. Quarantine hotel employees who have a higher level of education are less likely to experience anxiety, and those with higher incomes are less likely to experience depression.

Discussion: In order to mitigate the increasing levels of anxiety and depression among their staff, quarantine hoteliers or managers urgently need to implement mental health assistance programs, such as providing extra training in hygiene and knowledge about COVID-19, offering online counseling and psychological support services, training in positive thinking, encouraging staff to keep in touch with their personal support networks, and constructing a resilience model.

Keywords: COVID-19, quarantine hotel employee, Depression Anxiety and Stress Scale, DASS-21, mental health

Introduction

The outbreak of a novel coronavirus pneumonia, known as COVID-19, started in Wuhan, China, and spread rapidly and widely around the globe. The COVID-19 pandemic has caused thousands of deaths and continues to threaten the health and lives of the world's population.¹ The World Health Organization (WHO) swiftly declared the outbreak as a public health emergency of worldwide concern.²

Correspondence: Kun-Shan Wu
Email kunshan@mail.tku.edu.tw

Physically, COVID-19 attacks the virus carrier's immune system, jeopardizing their health and mortality. Less obviously, viral pandemics can also cause mental health problems, depending on a person's exposure to exaggerated or extreme media coverage.³

The number of confirmed cases entering China from abroad has slightly increased; however, within China, COVID-19 is currently well controlled. To mitigate the entry of COVID-19 from overseas, governments have imposed stringent protection measures for citizens and foreign visitors arriving from abroad, including mandatory 14-day quarantine periods in hotels. Worldwide, hotels have been commandeered by governments to be designated isolation/quarantine accommodation. This temporary adjusted hotel is known as the "quarantine hotel". In addition, due to the global implementation of strict quarantine measures, many people need isolation from immediate family members. Using quarantine hotels is a possible solution to address this demand for temporary quarantine accommodation.

Hosting quarantine guests significantly affects the working environment of quarantine hotel employees and as a result, they face a higher risk of infection. A quarantine hotel employee's role is similar to that of a healthcare worker, as they have direct contact with quarantine guests. This increases their exposure to respiratory droplets, which is the main route of transmission for COVID-19. The challenges for quarantine hotel employees are not only the increased workloads created by operating a quarantine hotel but also the greater potential to experience psychological issues (eg, depression, anxiety, and stress) associated with job insecurity, risk of exposure and contagion for themselves, their friends and families.

Previous research has investigated the psychological distress of the general population during a quarantine period. The results evidenced that there was a wide variety of psychological problems and negative mental health outcomes, such as panic disorder, depression, anxiety, and stress.⁴⁻⁶ In addition, some literatures indicate that front-line healthcare workers are particularly vulnerable to negative mental health effects as a result of the COVID-19 pandemic.⁷⁻¹¹

In China, quarantine hotel employees work directly with confirmed or suspected cases of COVID-19 that have entered from abroad. These quarantine hotel employees are faced with increased workloads and the threat of contracting COVID-19, which can potentially increase the amount of psychological pressure they experience. The mental health

of quarantine hotel employees is paramount to ensure effective performance of their duties. They should be provided with periodic screening to identify COVID-19-related depression, anxiety and stress, and opportunities to facilitate early intervention. Currently in China, there is no such provision for quarantine hotel employees.

Although studies have suggested that experiencing a severe infectious disease epidemic increases the prevalence of mental health issues,¹²⁻²² it is difficult to find relevant literature or empirical studies that explore quarantine hotel employees faced with the challenge of psychological resilience. Therefore, this study aims to investigate the mental health status and psychological impact on quarantine hotel employees during the COVID-19 pandemic.

Materials and Methods

Participants

A total of 170 quarantine hotel employees from Xiamen, Fujian Province, China were surveyed using the convenience sampling method, from May 20 to June 10, 2020, during the COVID-19 pandemic. In the Fujian Province, Xiamen is the only city with airports receiving international flights. Consequently, it now has approximately fifty quarantine hotels.

Human resource managers of the selected quarantine hotels posted a recruitment advert on their staff WeChat (similar to WhatsApp) group inviting their staff to participate in this survey. The advert explained the survey background, procedures and purpose. The post also included a declaration of anonymity and confidentiality, and the voluntary nature of participation.

Employees could join the online questionnaire survey by clicking the link or the QR (quick response) code. The survey participants who understood the survey requirements and who agreed to participate were instructed to complete the questionnaire. The survey obtained the participants' permission through informed consent. The data from the survey were kept anonymous and confidential.

Survey Instrument

The survey questionnaire included sociodemographic information and the Depression, Anxiety, and Stress Scale (DASS-21)²³ to measure and examine the mental health of participants and their levels of depression, anxiety, and stress. Demographic information included gender, age, education, and monthly income.

DASS-21 assesses the mental health of participants with the use of three subscales, depression, anxiety and stress. Each subscale contains seven items, and is scored using a 4-point Likert scale ranging from 0 (did not apply to me at all) to 3 (much or mostly applied to me). The depression subscale consists of questions 3, 5, 10, 13, 16, 17 and 21, and the score ranges are as follows: normal/no depression (0–9), mild depression (10–13), moderate depression (14–20), severe depression (21–27), and extremely severe depression (28 and above). The anxiety subscale consists of questions 2, 4, 7, 9, 15, 19, and 20, and the score ranges are as follows: normal/no anxiety (0–7), mild anxiety (8–9), moderate anxiety (10–14), severe anxiety (15–19), and extremely severe anxiety (20 and above). The stress subscale consists of questions 1, 6, 8, 11, 12, 14 and 18, and the score ranges are as follows: normal/no stress (0–14), mild stress (15–18), moderate stress (19–25), severe stress (26–33), and extremely severe stress (34 and above). Example items include “I couldn’t seem to experience any positive feeling at all” (depression), “I was aware of dryness of my mouth” (anxiety), and “I found it hard to wind down” (stress).

As the DASS-21 is a short-form version of the DASS-42, which contains 42 items, the final score for each subscale is multiplied by two and evaluated according to its severity rating index.²⁴ Depression, anxiety and stress scores are calculated by adding up the scores of the items in each separate subscale.

The validated Chinese version^{15,25,26} of the DASS-21 was used for this study. The Chinese version of DASS-21 has been demonstrated to be a good psychometric screening tool with good validity and reliability in the Chinese population.^{15,25,26} The results of this study reveal that Cronbach’s alpha for the total score of the DASS-21 questionnaire calculates as 0.97. Cronbach’s alpha for depression, anxiety, and stress calculates as 0.904, 0.924, and 0.934, respectively.

Statistical Analysis

For this study, the collected data were analyzed using the Statistical Package for the SPSS 22.0 and Chi-square analysis was applied to compare between groups. To identify related factors, the response binary logistic regression analysis was applied and expressed as odds ratio (OR) and 95% confidence interval (CI), with a significance level of 0.05 (two-tailed). For the final model, the Hosmer–Lemeshow test, which measures goodness of fit (p-value

> 0.05) was considered an appropriate logistic regression model.²⁷

Ethics Statement

An ethics approval was not required for this non-interventional study (e.g. surveys) as per Yango University’s guidelines and relevant regulations in China. However, after quarantine hotel managers agreed to participate in this study, and ethical approval clearance and informed consent clearance were granted by the Luo, Zhong You, Executive principle of Yango University, hence, an ethical approach (approval) was expected. For this research, the oral consent of the participants was obtained after the principles in the Declaration of Helsinki were expressed. This study was harmless to participants as in order to preserve anonymity, names have not been used, and all data were analyzed anonymously.

Results

Respondent Characteristics

Among the 170 participants who answered the questionnaire, 99 (58.2%) were female, and 71 (41.8%) were male. In terms of ages, 90 participants (53.0%) were born in Millennials and 32 (18.8%) were born in Gen Z. 128 participants (75.3%) indicated that their individual income was 6000 RMB or below per month and 103 participants (60.6%) had a junior college or undergraduate and above degree (Table 1).

Prevalence and Degrees of Depression, Anxiety and Stress

Out of the 170 survey participants, 38.8% were not depressed, 17.6% were mildly depressed, 40% were moderately depressed, 1.8% were severely depressed, and 1.8% were extremely severely depressed. Regarding anxiety levels, 25.3% were not anxious, 6.5% were mildly anxious, 54.7% were moderately anxious, 8.2% were severely anxious, and 5.3% were extremely severely anxious. The results also confirm that 79.4% of participants were not stressed, 12.4% were mildly stressed, 4.6% were moderately stressed, 1.8% were severely stressed, and 1.8% were extremely severely stressed (Table 2).

The prevalence of depression, anxiety, and stress is shown in Table 3. With a cutoff score of 14 for the DASS depression subscale, 43.5% of participants report depression symptoms. With a cutoff score of 10 for the DASS anxiety subscale, 68.2% of participants report

Table 1 Demographic Characteristics of Participants

Variables	Categories	Frequencies	Percentage (%)
Gender	Male	71	41.8
	Female	99	58.2
Age	Gen Z (born 1996+)	32	18.8
	Millennials (born 1977–1995)	90	53.0
	Gen X (born 1965–1976)	48	28.2
Education level	Middle school and below	20	11.8
	Senior high school/vocational school	47	27.6
	Junior college	57	33.5
	Undergraduate and above	46	27.1
Monthly income RMB	6000 and below	128	75.3
	6001 and above	29	17.1
	I do not want to talk about it	13	7.6

Table 2 Different Degrees of Depression, Anxiety and Stress Among Quarantine Hotel Employees

Severity Level	Depression		Anxiety		Stress	
	Frequencies	%	Frequencies	%	Frequencies	%
Normal	66	38.8	43	25.3	135	79.4
Mild	30	17.6	11	6.5	21	12.4
Moderate	68	40.0	93	54.7	8	4.6
Severe	3	1.8	14	8.2	3	1.8
Extremely severe	3	1.8	9	5.3	3	1.8

anxiety symptoms. When the cutoff score for the DASS stress subscale²³ is 19, 8.2% of participants report stress symptoms.

Prevalence of Depression, Anxiety, and Stress, Stratified by Age, Gender, Education, and Monthly Income

The prevalence of depression, anxiety, and stress, stratified by gender, age, education level and monthly income is

Table 3 Prevalence of Stress, Anxiety and Depression Among Quarantine Hotel Employees

Characteristics	Category	Frequencies (%)
Depression symptoms	No (<14)	96 (56.5)
	Yes (≥14)	74 (43.5)
Anxiety symptoms	No (<10)	54 (31.8)
	Yes (≥10)	116 (68.2)
Stress symptoms	No (<19)	156 (91.8)
	Yes (≥19)	14 (8.2)

shown in Table 4. Bivariate analysis of the results indicates that the prevalence of depression is significantly higher in employees with monthly incomes of 6000 RMB and below ($\chi^2 = 4.880$; $p = 0.087 < 0.1$). The prevalence of anxiety is significantly higher in Millennials employees than Gen X and Gen Z employees ($\chi^2 = 5.353$; $p = 0.069 < 0.1$). It is also higher in employees with a senior high school/vocational school education than employees with lesser levels of education ($\chi^2 = 17.860$; $p = 0.000 < 0.001$). Lastly, the prevalence of stress is evenly distributed between male and female participants (see Table 4).

Association of COVID-19-Related Factors with Depression, Anxiety, and Stress

Binary logistic regression with the “enter” method is used to evaluate if factors significant in bivariate analysis are strongly associated with depression, anxiety, and stress. In the bivariate analysis, monthly income is associated with depression, age and education level are associated with

Table 4 Sociodemographic of Quarantine Hotel Employees' Depression, Anxiety, and Stress

Characteristics	Total (n,%)	Depression			Anxiety			Stress		
		No (n,%)	Yes (n,%)	χ^2 (p-value)	No (n,%)	Yes (n,%)	χ^2 (p-value)	No (n,%)	Yes (n,%)	χ^2 (p-value)
Overall		96 (56.5)	74 (43.5)		54 (31.8)	116 (68.2)		156 (91.8)	14 (8.2)	
Gender										
Male	71 (41.8)	38 (22.4)	33 (19.4)	0.431(0.511)	20 (11.8)	51 (30.0)	0.727(0.394)	62 (36.5)	9 (5.3)	3.182(0.074)
Female	99 (58.2)	58 (34.1)	41 (24.1)		25 (14.7)	74 (43.5)		94 (55.3)	5 (2.9)	
Age										
Gen Z (born 1996+)	32 (18.8)	19 (11.2)	13 (7.6)	0.215(0.898)	11 (6.5)	21 (12.4)	5.353(0.069)	29 (17.1)	3 (1.8)	1.880(0.391)
Millennials (born 1977–1995)	90 (52.9)	51 (30.0)	39 (22.9)		34 (20.0)	56 (32.9)		83 (48.8)	7 (4.1)	
Gen X (born 1965–1976)	48 (28.2)	26 (15.3)	22 (12.9)		9 (5.3)	39 (22.9)		44 (25.8)	4 (2.4)	
Education level										
Middle school and below	20 (11.8)	12 (7.1)	8 (4.7)	2.923(0.404)	4(2.4)	16 (9.4)	17.860(0.000)	15 (8.8)	5 (3.0)	0.081(0.961)
Senior high school/vocational school	47 (27.6)	22 (12.9)	25 (14.7)		5 (2.9)	42 (24.7)		33 (19.4)	14 (8.2)	
Junior college	57 (33.5)	36 (21.2)	21 (12.3)		24 (14.1)	33 (19.4)		48 (28.2)	9 (5.3)	
Undergraduate and above	46 (27.1)	26 (15.3)	20 (11.8)		21(12.4)	25 (14.7)		39 (23.0)	7 (4.1)	
Monthly income										
6000 and below	128 (75.3)	70 (41.2)	58 (34.1)	4.880(0.087)	38 (22.4)	90 (52.9)	1.498(0.473)	115 (67.6)	13 (7.6)	2.671(0.263)
6001 and above	29 (17.1)	21 (12.4)	8 (4.7)		12 (7.1)	17 (10.0)		28 (16.5)	1 (0.6)	
I do not want to talk about it	13 (7.6)	5 (2.9)	8 (4.7)		4 (2.4)	9 (5.3)		13(7.6)	0 (0.0)	

Table 5 Logistic Regression Analysis for Factors Associated with Depression and Anxiety Regarding COVID-19

Characteristics	Depression		Anxiety	
	OR (95% CI)	P-value	OR (95% CI)	P-value
Gender (Reference: Male) Female	1.052 (0.544,2.038)	0.879	0.977 (0.463,2.064)	0.952
Age (Reference: Gen Z) Millennials Gen X	0.637 (0.187,1.618) 0.550 (0.257,1.578)	0.278 0.330	1.471 (0.569,3.804) 0.753 (0.224,2.533)	0.426 0.647
Education (Reference: Middle school and below) Senior high school/vocational school Junior college Undergraduate and above	1.630 (0.481,5.520) 0.871 (0.350,2.166) 1.382 (0.598,3.194)	0.433 0.766 0.449	0.363 (0.090,1.462) 0.151 (0.047,0.484) 0.877 (0.387,1.987)	0.154 0.001 0.753
Monthly income (Reference: Do not want to talk about it) 6000 and below 6001 and above	2.114 (0.596,7.496) 4.987 (1.084,22.949)	0.246 0.039	1.203 (0.301,4.818) 1.268 (0.255,6.307)	0.794 0.771
Hosmer–Lemeshow goodness of fit statistic	4.679	0.791	1.555	0.980
Nagelkerke R^2 value	6.5%		17.1%	

anxiety, and gender is associated with stress. The binary logistic regression analysis found that quarantine hotel employees with a monthly income of 6001 RMB and above, have higher odds of experiencing depression (vs do not want to talk about it, OR: 4.987, 95% CI=1.084–22.949, $p=0.027$), and those with a junior college education have lower odds of experiencing anxiety (vs middle school and below, OR: 0.151, 95% CI=0.047–0.484, $p=0.001$) (see Table 5). For the final model, the Hosmer–Lemeshow statistical test for measuring goodness of fit ($p\text{-value} > 0.05$) is considered an appropriate logistic regression model.²⁷

Discussion

COVID-19-related depression, anxiety, and stress are just some of the mental health problems affecting quarantine hotel employees. The results reveal that 43.5% of the respondents report moderate to extremely severe symptoms of depression; 68.2% report moderate to extremely severe symptoms of anxiety; and 8.2% report moderate to extremely severe symptoms of stress.

Due to a shortage of literatures related to quarantine hotel employees, a direct comparison is not possible. However, when comparing the results to other similar studies, this research evidences that the prevalence of depression in quarantine hotel employees is higher than the general population of the Philippines²⁰ (16.9%),

children and adolescents in China¹⁵ (17.66%), college students in Spain¹⁹ (18.4%), university staff in Southwest Ethiopia²⁸ (22.9%), doctors in India¹⁴ (34.9%), and nurses in Iran¹² (43%). In contrast, the prevalence of depression in quarantine hotel employees is lower than college and university students in Bangladesh¹⁶ (46.92%), Bangladeshi citizens²² (47.2%), and healthcare workers in China¹⁸ (50.4%). Moreover, in a meta-analysis,²⁹ the prevalence of depression is reported to be 33.7%. The high prevalence of depression among quarantine hotel employees in China is probably due to the increase in workloads created by operating a quarantine hotel, as well as job insecurity, risk of exposure and contagion for themselves, and fear of transmitting the disease to their family and friends.

In this study, the prevalence of anxiety is 68.2%, which is much higher than that of previous studies in other parts of the world. For instance, the prevalence of anxiety among healthcare workers is reported to be 54% in Iran,¹² 44.6% in China,¹⁸ 39.5% in India,¹⁴ and 21.7% in Peru.³⁰ In a meta-analysis,³¹ the prevalence of anxiety in healthcare workers is reported to be 23.2%. Studies^{12,30} conducted in other parts of the world indicate that the prevalence of anxiety is about 12.9% to 50%, whereas this study reports it to be considerably higher than this range. The high prevalence of anxiety in quarantine hotel employees could be attributed to the ongoing struggle they experience while working with guests suspected or confirmed to have COVID-19, whilst

also trying to protect themselves and their families. Both of which may heighten their anxiety toward the pandemic.

This study reports that the prevalence of anxiety is 8.2%, which is much lower than in the general population of the Philippines²⁰ (13.4%), nurses in Iran¹² (17.4%), university staff in Southwest Ethiopia²⁸ (28.2%), college and university students in Bangladesh¹⁶ (28.5%), Bangladeshi citizens²² (32.5%), doctors in India¹⁴ (32.9%), college students in Spain¹⁹ (34.5%), and healthcare workers in China¹⁸ (71.5%). In a meta-analysis,²⁹ the prevalence of stress is reported to be 29.6%. One possible reason for the low prevalence of stress among the quarantine hotel employees in China is the reduced fear of losing their jobs due to the impact of COVID-19. In general, the stress experienced by quarantine hotel employees in China is attributed to long shifts, stigmatization in the workplace, and fear of getting infected or infecting their families.

Furthermore, this study found that quarantine hotel employees with a junior college education are 0.288 times (OR=0.288; 95% CI: 0.102–0.812) less likely to suffer with depression, compared to those with a lower than middle school level education. Similarly, respondents with a junior college education are 0.177 times (OR=0.177; 95% CI: 0.050–0.628) less likely to suffer with anxiety issues, compared to those with a lower than middle school level of education. This could be because those with lower levels of education may not have the same amount of information and knowledge regarding the mortality and morbidity of COVID-19. As a result, they may worry less about the COVID-19 pandemic, which consequently, serves as a protective factor.

The results show that respondents with a monthly income of 6001 RMB or above are 6.628 times more likely to suffer with depression, compared to those who did not want to talk about their monthly income. This may be because, as a result of COVID-19 being declared a state of emergency, middle-to-high income earners are now employed as white-collar workers with much lower daily incomes than they are used to having.

Conclusions, Implications and Limitations

During March 2020 to June 2020, the overseas trend in confirmed COVID-19 cases increased compared to the number of domestic confirmed cases. Currently, the COVID-19 epidemic is well controlled in China. The challenges for quarantine hotel employees are not only

the increased workloads created by operating a quarantine hotel but also high psychological stress associated with job insecurity, risk of exposure and contagion for themselves, their friends and families. During the COVID-19 pandemic, concern for the mental health of quarantine hotel employees, who are facing unprecedented changes, is undoubtedly necessary. Specific screening strategies should be adopted quarantine hotels employees, as poor mental health conditions can negatively affect performance of their duties and subsequently, their customer service. Proper measures should be taken to reduce extended duty hours, so as not to overburden quarantine hotel employees.

In summary, the findings reveal that most quarantine hotel employees in China have moderate-to-severe symptoms of depression and anxiety. This study shows that the prevalence of depression and anxiety in quarantine hotel employees is greater than previous studies have found in other healthcare workers around the world. This might be because quarantine hotel employees usually have a lower income and educational background than healthcare workers, as well as a lack of knowledge toward the pandemic.

As they now face extremely high rates of anxiety and depression among their staff, quarantine hoteliers and/or managers urgently need to implement mental health assistance programs. Firstly, preventing anxiety and depression among employees relies on additional training, as it is a critical component to the readiness and competence of quarantine hotel employees in response to any disaster or disease outbreak. It is essential that employees are knowledgeable, skillful, oriented and familiar with the content of workplace protocol.³² For instance, extra training on hygiene and COVID-19 and its infection trajectory³³ should be provided, as anxiety in employees likely results from concerns regarding the risk of infection whilst performing their duties and a lack of knowledge about COVID-19.

Secondly, middle-aged or younger quarantine hotel employees with higher levels of education, who suffer from anxiety, probably do so as they have easy access to online information and may watch/read excessive negative news and/or reports on the COVID-19 pandemic. As a result, for such workers, providing psychological support services, such as online counseling and training in positive thinking, is necessary.²¹

Thirdly, the creation of coping strategies for quarantine hotel employees amid the COVID-19 pandemic to assist with their depression, namely staying in touch with their personal support networks, building positive workplaces,

opening protective and private communication pathways, and constructing a resilience model.³² This echoes the view of a prior study that states that limiting people's psychological damage demands mapping the rates of stress and anxiety for effective psychological treatment to heighten people's mental wellbeing.³⁴ By doing this, it is expected that the levels of depression, anxiety, and stress toward COVID-19 will be reduced. The results of this study can provide a reference for targeted mental health education and intervention for quarantine hotel employees.

Lastly, encourage quarantine hoteliers to implement new robotic technology to complete room and meal services and check-out procedures. While working with quarantine guests, it is necessary to reduce contact by minimizing their time in public areas and providing contactless services, as this decreases the risk of COVID-19 transmission and cross-infection. This will help alleviate the pressure on quarantine hotel employees while on duty at work, and further mitigate any development of anxiety and depression.

This study has some limitations. Firstly, the convenience sampling strategy was applied and partly represented five quarantine hotels in Xiamen, Fujian Province, China. Consequently, this may limit the generalization of the results, with respect to the population of all employees of quarantine hotels from all provinces in China. In the future, more studies are warranted to investigate quarantine hotel employees in different countries. Furthermore, only the mental health (depression, anxiety and stress) of quarantine hotel employees was investigated. This study did not include coping strategies and prevention programs, which could be researched in future studies.

Acknowledgment

These authors have contributed equally to this work and share first authorship: Yi-Man Teng and Kun-Shan Wu.

Disclosure

The authors report no conflicts of interest for this work.

References

- Girma S, Alenko A, Agenagnew L. Knowledge and precautionary behavioral practice toward COVID-19 among health professionals working in public university hospitals in Ethiopia: a web-based survey. *Risk Manag Healthc Policy*. 2020;13:1327–1334. doi:10.2147/RMHP.S267261
- World Health Organization. Mental health and psychosocial considerations during the COVID-19 outbreak. WHO. March 18, 2020. Available from: <https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf>.
- Garfin DR, Silver RC, Holman EA. The novel coronavirus (COVID-2019) outbreak: amplification of public health consequences by media exposure. *Health Psychol*. 2020;39(5):355–357. doi:10.1037/hea0000875.
- Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implication and policy recommendations. *Gen Psychiatry*. 2020;33(2):e100213. doi:10.1136/gpsych-2020-100213.
- Rossi R, Socci V, Talevi D, et al. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. *Front Psychiatry*. 2020;11:790. doi:10.3389/fpsy.2020.00790
- Zhao Y, An Y, Tan X, Li X. Mental health and its influencing factors among self-isolating ordinary citizens during the beginning epidemic of COVID-19. *J Loss Trauma*. 2020;25(6–7):580–593. doi:10.1080/15325024.2020.1761592
- Kang L, Li Y, Hu S, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. 2020;7(3):e14. doi:10.1016/S2215-0366(20)30047-X.
- Ramaci T, Barattucci M, Ledda C, Rapisarda V. Social stigma during COVID-19 and its impact on HCWs outcomes. *Sustainability*. 2020;12(9):3834. doi:10.3390/su12093834
- Roy D, Tripathy S, Kar S, Sharma N, Verma S, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatr*. 2020;51:102083–102087. doi:10.1016/j.ajp.2020.102083
- Walton M, Murray E, Christian MD. Mental health care for medical staff and affiliated healthcare workers during the COVID-19 pandemic. *Eur Heart J Acute Cardiovasc Care*. 2020;9(3):241–247. doi:10.1177/2048872620922795
- Wong AH, Pacella-LaBarbara ML, Ray JM, Ranney ML, Chang BP. Healing the healer: protecting emergency health care workers' mental health during COVID-19. *Ann Emerg Med*. 2020;1–6. doi:10.1016/j.annemergmed.2020.04.041
- Aziznejadrosan P, Qalehsari MQ, Zavardehi FS. Stress, anxiety, depression among nurses caring for COVID-19 patients in Babol, Iran: a logistic regression. *Res Sq*. 2020. doi:10.21203/rs.3.rs-98099/v1
- Balaran ET. Knowledge, attitudes, anxiety, and coping strategies of students during COVID-19 pandemic. *J Loss Trauma*. 2020;25(8):635–642. doi:10.1080/15325024.2020.1769300
- Chatterjee SS, Bhattacharyya R, Bhattacharyya S, Gupta S, Das S, Banerjee BB. Attitude, practice, behavior, and mental health impact of COVID-19 on doctors. *Indian J Psychiatry*. 2020;62(3):257–265. doi:10.4103/psychiatry.IndianJPsychiatry_333_20
- Dong H, Yang F, Lu X, Hao W. Internet addiction and related psychological factors among children and adolescents in China during the coronavirus disease 2019 (COVID-19) epidemic. *Front Psychiatry*. 2020;11:00751. doi:10.3389/fpsy.2020.00751
- Khana AH, Sultana S, Hossain S, Hasan T, Ahmed HU, Sikder T. The impact of COVID-19 pandemic on mental health & wellbeing among home-quarantined Bangladeshi students: a cross-sectional pilot study. *J Affect Disord*. 2020;277:121–128.
- Khattak SR, Saeed I, Rehman S, Fayaz M. Impact of fear of COVID-19 pandemic on the mental health of nurses in Pakistan. *J Loss Trauma*. 2020. doi:10.1080/15325024.2020.1814580
- Lai J, Ma S, Wang Y, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. 2020;3(3):e203976.
- Ramón-Arbués E, Gea-Caballero V, Granada-López JM, Juárez-Vela R, Pellicer-García B, Antón-Solanas I. The prevalence of depression, anxiety and stress and their associated factors in college students. *Int J Environ Res Public Health*. 2020;17(19):7001–7016. doi:10.3390/ijerph17197001
- Tee ML, Tee CA, Anlacan JP, et al. Psychological impact of COVID-19 pandemic in the Philippines. *J Affect Disord*. 2020;14:39–49. doi:10.1016/j.jad.2020.08.043

21. Wang ZH, Yang HL, Yang YQ, et al. Prevalence of anxiety and depression symptom, and the demands for psychological knowledge and interventions in college students during COVID-19 epidemic: a large cross-sectional study. *J Affect Disord.* **2020**;275:188–193. doi:10.1016/j.jad.2020.06.034
22. Zubayer AA, Rahman E, Islam B, et al. Psychological states of Bangladeshi people four months after the COVID-19 pandemic: an online survey. *Heliyon.* **2020**;6(9):e05057. doi:10.1016/j.heliyon.2020.e05057
23. Lovibond PF, Lovibond SH. The structure of negative emotional states: comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and anxiety inventories. *Behav Res Ther.* **1995**;33(3):335–343. doi:10.1016/0005-7967(94)00075-U
24. Antony MM, Bieling PJ, Cox BJ, Enns MW, Swinson RP. Psychometric properties of the 42-item and 21-item versions of the depression anxiety stress scales in clinical groups and a community sample. *Psychol Assess.* **1998**;10(2):176–181. doi:10.1037/1040-3590.10.2.176
25. Wang K, Shi HS, Geng FL, et al. Cross-cultural validation of the Depression Anxiety Stress Scale-21 in China. *Psychol Assess.* **2016**;28(5):e88–e100. doi:10.1037/pas0000207
26. Wang YY, Long J, Liu YH, Liu TQ, Billieux J. Factor structure and measurement invariance of the problematic mobile phone use questionnaire-short version across gender in Chinese adolescents and young adults. *BMC Psychiatry.* **2020**;20(1):34. doi:10.1186/s12888-020-2449-0
27. Hosmer DW, Lemeshow S. Goodness-of-fit tests for the multiple logistic regression model. *Comm Stat A.* **1980**;9(10):1043–1069. doi:10.1080/03610928008827941
28. Yeshaw Y, Mossie A. Depression, anxiety, stress, and their associated factors among Jimma University staff, Jimma, Southwest Ethiopia, 2016: a cross-sectional study. *Neuropsychiatr Dis Treat.* **2017**;13:2803–2812. doi:10.2147/NDT.S150444
29. Salari N, Hosseini-Far A, Jalali R, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Glob Health.* **2020**;16(1):57. doi:10.1186/s12992-020-00589-w
30. Yáñez JA, Jahanshahi AA, Alvarez-Risco A, Li J, Zhang SX. Anxiety, distress, and turnover intention of healthcare workers in Peru by their distance to the epicenter during the COVID-19 crisis. *Am J Trop Med Hyg.* **2020**;103(4):1614–1620. doi:10.4269/ajtmh.20-0800
31. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among health care workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun.* **2020**;S0889–1591. doi:10.1016/j.bbi.2020.05.026
32. Teng YM, Wu KS, Lin KL. Life or livelihood? Mental health concerns for quarantine hotel workers during the covid-19 pandemic. *Front Psychol.* **2020**;11:2168. doi:10.3389/fpsyg.2020.02168
33. Abdelhafiz AS, Mohammed Z, Ibrahim ME, et al. Knowledge, perceptions, and attitude of egyptians towards the novel coronavirus disease (COVID-19). *J Community Health.* **2020**;1–10. doi:10.1007/s10900-020-00827-7
34. Al-Hanawi MK, Mwale ML, Alshareef N, et al. Psychological distress amongst health workers and the general public during the COVID-19 pandemic in Saudi Arabia. *Risk Manag Healthc Policy.* **2020**;13:733–742. doi:10.2147/RMHP.S264037

Risk Management and Healthcare Policy

Dovepress

Publish your work in this journal

Risk Management and Healthcare Policy is an international, peer-reviewed, open access journal focusing on all aspects of public health, policy, and preventative measures to promote good health and improve morbidity and mortality in the population. The journal welcomes submitted papers covering original research, basic science, clinical & epidemiological studies, reviews and evaluations,

guidelines, expert opinion and commentary, case reports and extended reports. The manuscript management system is completely online and includes a very quick and fair peer-review system, which is all easy to use. Visit <http://www.dovepress.com/testimonials.php> to read real quotes from published authors.

Submit your manuscript here: <https://www.dovepress.com/risk-management-and-healthcare-policy-journal>