

Research Article

Perceived Stress and Associated Factors During the Late Stages of Covid-19 Among Health Care Professionals at Eka Kotebe and Zewditu Memorial Hospital, Addis Ababa, Ethiopia: A Cross-Sectional Study

Winta Tesfaye^{1*}; Hiwot Tezera²; Tseganesh Assefa³;
Kirubel Girmay⁴; Habtu Kifle Negash⁵

¹Department of Human Physiology, School of Medicine, University of Gondar, Ethiopia

²Department of Biochemistry, School of Medicine, University of Gondar, Ethiopia

³Department of Medical Nursing, School of Nursing, University of Gondar, Ethiopia

⁴Department of Psychiatry, Collage of Health Science, Addis Ababa University, Ethiopia

⁵Department of Human Anatomy, School of Medicine, University of Gondar, Ethiopia

*Corresponding author: Winta Tesfaye

Department of Human Physiology, School of Medicine, University of Gondar, P. O. Box 196, Gondar, Ethiopia.
Email: Wintatesfaye0990@gmail.com

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Abstract

The COVID 19 virus, also known as the coronavirus is an illness that can range from mild to severe. It is primarily transmitted through contact, with infected materials. Can cause symptoms like fever, coughing, difficulty breathing, muscle pain or fatigue and a runny nose. Health care professionals who work in the stages of the COVID 19 outbreak are at a risk of experiencing stress related issues. This is due to the workload they face concerns, about getting infected and inadequate equipment. The aim of this study was to evaluate the perceived stress levels and factors associated with it among health care professionals working in hospitals located in Addis Ababa, Ethiopia during the stages of COVID 19.

Methods: From the 30th of January to the 15th of February 2022, an institution-based cross-sectional study of 650 health care professionals was undertaken. After allocating a proportion to each health institute based on the amount of health care experts, study participants were chosen using a simple random sampling procedure. To collect data, a pre-tested and structured interviewer-administered questionnaire utilizing the KOBO collect survey tool was used. Based on the perceived stress scale, a total score of more than 20 points was determined the cut off for feeling perceived stress. To find related factors, bivariable and multivariable logistic regression analyses were used. In multivariable logistic regression, the level of statistical significance was fixed at less than 0.05.

Results: The prevalence of Perceived stress in this study was Nearly one-thirds 44.4% (95% CI: 41%, 48%) of HCPs had perceived stress. Being female (AOR = 1.4, 95% CI: 1.06, 2.06), age group 25-31 (AOR = 0.5, 95% CI: 0.3, 0.9), having child/children (AOR = 0.3, 95% CI: 0.25, 0.52), Cigarette smoking (AOR = 2.2, 95% CI: 1.2, 3.8), and not doing exercise (AOR = 1.9, 95% CI: 1.1, 3.1) were positively association with perceived stress.

Conclusion: The current study found that perceived stress was highly prevalent among health care providers during the late stage of covid 19 pandemic and had significant associations with sex, age, having children, cigarette smoking and regular exercise. By implication, these findings should alert Health care professionals of the need to early detect these determinants of perceived stress. As a result, we recommend that health care providers to focus on early regular screening for stress.

Keywords: Perceived stress; Perceived stress scale; Health care professionals; Ethiopia

Abbreviation: AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; HCPS: Health Care Professionals; PSS: Perceived Stress Scale; STATA: Statistical Software for Data Science

Introduction

The COVID-19 virus, also known as the coronavirus is an illness that can range from mild to severe and was discovered in December 2019. COVID-19 was declared a pandemic by the World Health Organization on March 11, 2020, due to the virus's subsequent global impact. It is primarily transmitted through contact, with infected materials. Can cause symptoms like fever, coughing, difficulty breathing, muscle pain or fatigue and a runny nose [1]. It is a new strain that was first discovered in 2019 in Wuhan, China. COVID-19 has wider community transmission owing to its capability to be transmitted even when carriers are asymptomatic [1]. In half of January 2021, over 98 million infections were recorded globally, claiming the lives of over 2.1 million people [2]. Ethiopia is one of the countries threatened by COVID-19, with a total of 336,762 confirmed cases and 5,254 registered deaths as of September 23/2021 [3]. It is now the leading country in East Africa with the highest number of infected people. Thousands of HCPs have been infected with COVID-19 [4].

Fears of a pandemic of the Corona virus urge the government to mobilize an emergency response and extend a travel ban. Due to the excessive clinical workload, fear of contagion, and inadequate protective gear, healthcare workers are at a greater risk of developing mental health disorders. During outbreaks, healthcare personnel are at a significant risk of getting stress-related issues [5]. During COVID-19, the general people displayed perceived stress behaviors, resulting in a nationwide shortage of medical masks and alcohol. Furthermore, many medical professionals work more than 16 hours per day on average, resulting in insufficient sleep [1]. Many studies have been conducted around the world to examine the amount of felt stress among health care workers prior to the pandemic [6,7]. However, just a few studies on the same topic were undertaken during and after the COVID-19 pandemic. According to the existing research, health care professionals have a high perceived stress level. For example, the pooled prevalence of stress among health care professionals worldwide was 34%, and the pooled prevalence rate of psychological morbidities with regard to the impact of the COVID-19 pandemic was 44% [5,8].

A study conducted in Iraq showed that more than two-thirds of health care professionals had a moderate level of stress, nearly one-fifth had low and 9.6% of health care professionals had a high level of stress [5], the perceived stress level recorded was two-thirds 61.8% in Ethiopia [9], a systematic review and meta-analysis study in Ethiopia showed pooled prevalence of 51% [10].

The global COVID-19 pandemic has created a massive public health crisis and several challenges for healthcare providers [11]. The social, economic, and health effects are extensive, where they are related to increased all-cause mortality, occupational disability, poor quality of life, and cardiovascular disease risk [12]. Despite its multiple consequences, mental health is often neglected as a public health agenda [13].

The present pandemic's psychological consequences are produced by a number of causes, including concerns about competency when redeployed without proper training, uncertainty

about the duration of the crisis, and inaccurate information about the vaccine's efficiency, depletion of personal protection equipment, workload, the need to take stressful precautions during the medical examination/in the operative fields, and the need to take stressful precautions during the medical examination/in the operative fields [1].

A number of research articles published over the past few months showed that a significant proportion of healthcare providers [1]. Despite this, there is insufficient evidence about the mental health impact of COVID-19 among front-line health care providers in Addis Abeba, Ethiopia. As a result, the current study sought to ascertain the levels and predictors of stress among front-line healthcare personnel at Addis Abeba public hospitals. This would allow policymakers, healthcare executives, and stakeholders to utilize the results as a baseline for planning and implementing interventional initiatives.

Methods and Materials

Study Design

An institutional-based cross-sectional study design was conducted.

Study Period and Area

The study was conducted at health centers in Addis Abeba city from January 30, 2022 to February 15, 2022. The current metro area population of Addis Ababa in 2021 was 5,006,000. There are 11 sub-city and 116 woreda administrations and a total of 12 government-owned hospitals, 98 public health centers, 31 private hospitals, and 700 different level private clinics in Addis Ababa. Eka Kotebe General Hospital is the first COVID-19 treatment center in Ethiopia. The center is located in Addis Ababa, the capital of Ethiopia, where the highest number of cases of COVID-19 was recorded among all towns in Ethiopia. For the first time in Ethiopia, on 13 March 2020, 450 infected and suspected patients entered this facility, and 73 patients were confirmed to have COVID-19. The Eka Kotebe COVID-19 Treatment Center was relatively the only well-equipped treatment center in terms of ventilator machine, availability of the COVID-19 diagnosis test, and healthcare providers [14]. On the other hand, Zewditu Memorial Hospital is one of the 6 hospitals administered by the Addis Ababa health office. It is located in the central part of the city. It has a total of 885 staff, 580 of them are health care professionals [15].

Source populations

All health care providers who were working in the selected public health institutions.

Study Population

The randomly selected health care providers from the selected public health institution.

Inclusion Criteria

All health care providers who were working in the selected public health institutions.

Exclusion Criteria

Those health care providers who were mentally/critically ill and on annual leave were excluded from the study.

Sample size

The minimum sample size was determined by using a single population proportion formula [$n = [(Z \alpha/2)^2 \cdot P (1-P)]/d^2$] by assuming a 95% confidence level ($Z \alpha/2 = 1.96$), a margin of error of 5%, $P =$ proportion of health care providers who were stressed in Southern Ethiopia (61.8%) [9] and after accounting for design effect 1.5 and 5% addition for non-response rate. The final sample size became 692.

Sampling Procedure

A simple random sampling technique was applied to select the study participants. In the first stage, the two hospitals were purposely selected from 12 hospitals in the city. The total sample size was allocated to the selected hospitals proportional to their estimated HCPs at the time of the study. In the second stage, clinical departments or units were identified, and in the third stage, study participants were selected proportionally to the estimated number of HCPs listed in the different departments or units of the hospital, using simple random sampling. All eligible HCPs in each department/unit who consented to participate were selected into the study using simple random sampling.

Data Collection Tools and Methods

Quantitative data was collected using a pretested structured questionnaire using KOBO collect survey tool. The questionnaire was prepared originally in English and was translated to Amharic, and then translated back to English to ensure consistency in meaning. The questionnaire contained socio-demographic characteristics (age, sex, profession, qualification, income, religion, marital status, ethnicity, and work experience).

Data on perceived stress were collected with a perceived stress scale (PSS-10) which is a 10-item scale. The tool has a 5-point Likert response. Each item was scored with 0 = Never, 1 = Almost Never, 2 = Sometimes, 3 = Fairly Often, and 4 = Very Often, which was employed to evaluate each item. The total score ranged from 0 to 40 [16]. During data collection, a reliability analysis was done and the result showed a good score of internal consistency between the items (Cronbach's $\alpha = 0.79$).

Study Variable

The questionnaire contained socio-demographic characteristics (age, sex, profession, qualification, income, religion, marital status, ethnicity, and work experience), Health related issue (Previous psychiatric history, chronic illness, fear of dying due to covid 19, Substance use (Cigarette smoking, Khat chewing and Drinking Alcohol). Data on perceived stress were collected with a perceived stress scale (PSS-10) questioner which is a 10-item scale.

Operational Definition

Perceived stress

10 Likert scale questions measuring perceived stress status of the respondents was used. The score of stress assessing question was calculated for each respondent then overall score was computed and the status was classified in to no perceived stress and perceived stress. A total score of >20 points was con-

sidered as the cut off for experiencing perceived stress based on perceived stress scale [17].

Statistical Analysis

After checking for the completeness and consistency of the collected data, the data were entered into Epi-data version 3.02 and exported to SPSS version 25 for analysis. To express descriptive results, frequency with percent and mean with standard deviation were computed.

A binary logistic regression was performed to determine the crude association between each independent variable by viewing the Crude Odds Ratio (COR) result. Variables in the bi-variable analysis with a p -value < 0.25 were candidates for multi-variable binary logistic regression analysis and Adjusted Odds Ratio (AOR) with 95% CI were calculated. For the multi-variable analysis, variables with a p -value ≤ 0.05 were considered statistically significant.

Data Collectors and Data Quality Controls

Training was given for the data collectors and supervisors for three days. Pretest was done and amendment was performed accordingly. The data was collected using ten BSC nurses and the supervision was undertaken by five MSC health care professionals. The PSS data collection tool is valid in Ethiopia [16]. To check the reliability of the data we calculated cronbach alpha result of PSS tool in this study is 0.79.

Ethical Consideration

Ethical clearance was obtained from the Ethical Review Board of University of Gondar with ethical clearance number 2478/2014. To ensure the confidentiality of respondents, an informed oral consent was obtained from each study participant and their names were not written on the questionnaire which reduce the authors access to information that could identify individual participants during or after data collection.

Result

Table 1 shows that from the total sample 650 completed the interview with response rate of 93.9%. More than half 364(56%) of the respondents were males and nearly one-third 259(39.8%) of the respondents were single and regarding educational status 54(8.3%), and 555(85.4%) of the respondents were diploma and first-degree holders respectively. Regarding the profession of the respondents 368 (58.8%) of them were clinical nurse, followed by midwifery 73 (11.2%) presented on Table 1.

Substance Use

In terms of substance use, 64 (9.8%), 495 (76.2%), and 70 (10.8%) of the subjects were cigarette smokers, alcoholic drinkers, and khat chewers, respectively is shown on Table 2.

Health Related Issue

Table 3 shows from the overall study participants 43 (6.6%) of those who participated had chronic disease. The majority of subjects (82.3%) reported no psychiatric illness. Additionally, many of the participants gave positive response for feeling of dying due to covid-19.

Perceived Stress of the Respondents

Table 4 Shows the prevalence of perceived stress which is 44.5% among health care professionals The majority of the respondents were very annoyed by things that happened outside

Table 1: Sociodemographic characteristics of health care professionals working at Eka Kotebe and Zewditu memorial Hospital, Addis Ababa, Ethiopia: A cross-sectional study 2022 (n=650).

Variable	Frequency	Percentage
Age (in years)	18-24	71 10.9%
	25-31	377 58%
	>31	202 31.1%
Sex	Male	364 56%
	Female	286 44%
Marital status	Single	259 39.8%
	Married	370 56.9%
	Divorced	17 2.6%
	widowed	4 0.6
Religion	Orthodox	396 84.6
	Muslim	126 6.3
	Protestant	95 3.2
	others	33 5.8
Having children	yes	452 69.5%
	NO	198 30.5%
Working profession	Nurse	368 56.6%
	Medical doctor	54 8.3%
	midwifery	73 11.2%
	Lab	66 10.2%
	Pharmacy	26 4%
	HO	18 2.8%
Educational status	Diploma	54 8.3
	BSc	555 85.4
	MSc	41 5.4
	Work Experience	<1
1-5		302 46.5
>5		258 39.7

Table 2: Substance use of health care professionals working at Eka Kotebe and Zewditu memorial Hospital, Addis Ababa, Ethiopia: A cross-sectional study 2022 (n= 650).

Variable	Frequency	Percentage %
Cigarette smoking	Yes	64 9.8%
	NO	586 90.2%
Drinking Alcohol	YES	495 76.2%
	NO	155 23.8%
Chewing Khat	Yes	70 10.8%
	No	580 89.2%

Table 3: Health related issue of health care professionals working at Eka Kotebe and Zewditu memorial Hospital, Addis Ababa, Ethiopia: A cross-sectional study 2022 (n= 650).

Variable	Frequency	Percent
Psychiatric Illness	Yes	52 8
	No	598 92
Chronic Illness	Yes	43 6.6
	No	607 93.4
Feeling of dying due to covid-19	Yes	624 96
	No	26 4
Availability of safety material	Yes	567 86.15
	No	83 13.9
Exercise	Yes	99 15.2
	No	551 84.8

Table 4: Prevalence of perceived stress of health care professionals working at Eka Kotebe and Zewditu memorial Hospital, Addis Ababa, Ethiopia: A cross-sectional study 2022 (n= 650).

Perceived Stress	Frequency	Percent%
Yes	289	44.5%
No	361	55.5%

Table 5: Factors associated with perceived stress of health care professionals working at Eka Kotebe and Zewditu memorial Hospital, Addis Ababa, Ethiopia: A cross-sectional study 2022 (n= 650).

Variables	Categories	perceived Stress		OR (95% CI)	
		Yes	No	COR	AOR
Sex	Male	147(40.4%)	217(59.6%)	1	1
	Female	142(49.7%)	144(50.3%)	1.45(1.06-1.9)	1.4(1.06-2.06)**
Age	18-24	40(56.3%)	31(43.7%)	1	1
	25-31	152(40.3%)	225(59.7%)	0.5(0.3-0.8)	0.5(0.3-0.9)**
	>31	97(48%)	105(52%)	0.7(0.4-1.2)	0.7(0.4-1.4)
Education- al Status	Diploma	16(29.6%)	38(70.4%)	1.3(0.5-3.2)	1.6(0.2-9.7)**
	BSc	263(47.4%)	292(52.6%)	2.7(1.3-5.8)	0.8(0.1-5.8)
	MSc	10(24.4%)	31(75.6%)	1	1
Having Children	Yes	168(37.2%)	284(62.8%)	0.3(0.2-0.5)	0.3(0.25-0.52)**
	No	121(61.1%)	77(38.9%)	1	1
khat chewing	Yes	32(45.7%)	38(54.3%)	1.5(0.9-2.5)	1.05(0.5-1.9)
	No	251(43.3%)	329(56.7%)	1	1
Cigarette Smoking	Yes	39(60.9%)	25(39.1%)	2.09(1.2-3.5)	2.2(1.2-3.8)**
	No	250(42.7%)	336(57.3%)	1	1
Exercise	Yes	30(30.3%)	69(69.7%)	2.04(1.2-3.2)	1.9(1.1-3.1)**
	No	259(47%)	292(53%)	1	1
Psychiatric Illness	Yes	28(53.8%)	24(46.2%)	1	1
	No	261(43.6%)	337(56.4%)	1.5(0.8-2.6)	1.4(0.7-2.6)

N.B. (**): Statistically significant; COR: Crud Odds Ratio; AOR: Adjusted Odds Ratio)

very often, while some others felt well fairly often. On the other hand, the majority of the respondents were able to complete the important events in their life properly, while others could not cope with all the things happening outside.

Associated Factors of Perceived Stress

In the bi-variable logistic regression analysis, variables with p value < 0.2 were included into multivariable logistic regression model. Accordingly, Age, sex, having children, khat chewing and not performing exercise were significantly associated with perceived stress (p≤0.05).

According to Table 5 Female partakers were 1.4 times [AOR=1.4 95%CI (1.06, 2.06) more likely to experience perceived stress compared to male participants. Participants in the age gap 18-24 were 0.5 times [AOR=0.5, 95%CI (0.3, 0.9) more likely to have perceived stress than their counterparts. Participants who did not have regular exercise were 1.1 times more likely to have perceived stress than those who had regular exercise. Cigarette Smokers were two times [AOR =2.2, 95% CI (1.2, 3.8)] more likely to experience perceived stress than those who don't smoke Cigarette. Lastly, Participants with child or Children were 0.3 times more likely to have poor sleep quality than those without depression [AOR =0.3, 95% CI (0.25, 0.52)].

Discussion

Health care professionals are at higher risk of developing stress-related problems during outbreaks like covid 19. The current study aimed at investigating the prevalence and associated factors of perceived stress in the late stages of covid 19 among health care professionals working at Eka Kotebe and Zewditu memorial Hospital. The prevalence of perceived stress in this study was 44.5% [95% CI (41, 48%)]. The prevalence of perceived stress in this study is higher than the findings of a

study conducted in Wuhan, China, by Dai et al which is (39.1%) [18]. The possible explanation might be due to the sampling size, sampling technique (convenience sampling), and different tools, while they used a general health questionnaire (GHQ-12). Other supporting reason for variation could be due to the fact that the current study was conducted in the resources limited setting. Thus, health care workers are facing physical separation and increased in care demands, equipment shortages, and the higher risk of COVID-19 infection, which make the health professional prone to developing perceived stress [1].

In contrary, the finding of this study is lower than the study conducted in China (51.6%) [19], the two studies in, Ethiopia (61.8%) [9] and 51.6% [20] and systematic review and meta-analysis study in Ethiopia showed pooled prevalence of 51%. The possible reason for this variation between different studies may be due to the difference in study population (the previous Ethiopian studies were conducted among southern town health care professionals). Additionally, the above studies were conducted during the early stages of Covid 19 which makes them more venerable for stress.

The present study identified that Sex, Age, Having Child/Children, Cigarette Smoking and Exercise as the associated factors with Perceived Stress. The odds of having perceived stress on COVID-19 among respondents who were in the age range of 25–31 years was 0.7 times more likely as compared to that in the age range of 18–24 years of respondents. Which is in line with a study conducted in Ethiopia where age group 18-24 were 3 times more likely to have perceived stress than the age range 18-24 [20]. The possible reason according to the CDC could be Older adults are more likely to get very sick or die from COVID-19. So, this might trigger stress in older adults when compared to their counter parts [21].

In the current study female gender was associated with increased odds of Perceived stress. Which is in line with the study finding from Ethiopia, in which females were 2.39 times more likely to experience high perceived stress than men [22]. This might be because, household and family responsibility is observed mainly on women compared to men. This study also revealed that, Having Child/Children have increased odds of perceived stress than people who have no children. The result of this study is in line with the finding of a study conducted in Canada. The reason for this could be due to pressures, including worrying about their children's health, mental health, education and being stressed about looking after children while continuing to work during the covid pandemic [23]. The other reason behind this could also be because of working in the hospital could make parents vulnerable for corona virus which makes them stressed not to communicate the disease to their family.

As of the present study's result, cigarette smokers have demonstrated two time's higher odds of perceived stress than non-smokers. The possible explanation could be Cigarette smoke induces epigenetic modifications of the bronchial epithelium, leading to mucous (goblet) cell metaplasia. As goblet cells are a major source of ACE2 in the lung, this could, in part, justify the increased levels of ACE2. As a result an increase in ACE2-producing goblet cells in ever-smoker than never-smoker lungs. These have putatively important implications for patients with COVID-19 because ACE2 has been shown to be the receptor used by SARS-CoV-2 to enter the host cells which leads to increased risk for Covid 19 disease which will make participants more stressed [24].

The present study showed that participants who did not engage in regular exercise were 2 times more likely to experience perceived stress. To explain this association, physical activity can induce stress relive Physical activity improves your body's ability to use oxygen and also improves blood flow. Both of these changes have a direct effect on your brain. Exercise also increases your brain's production of endorphins. Endorphins are the "feel-good" neurotransmitters that are responsible for the coveted "runner's high." This is the sense of well-being and euphoria that many people experience after exercise [25]. For adults the WHO recommends at list 150 min of moderate intensity or at list 75 min of vigorous –intensity aerobic physical activity per week [26].

Limitation of the Study

Our study is not free from limitations. Because the study is cross-sectional, we are unable to show a cause-effect relationship between independent variables and perceived stress. Another limitation of this research could be recall bias.

Conclusion

The current study found that perceived stress was highly prevalent among health care providers during the late stage of covid 19 pandemic and had significant associations with sex, age, having children, cigarette smoking and regular exercise. By implication, these findings should alert Health care professionals of the need to early detect these determinants of perceived stress. As a result, we recommend that health care providers to focus on early regular screening for stress, as well as pay special attention to behaviors such as cigarette smoking and exercise.

Author Statements

Declaration

Ethical approval and consent to participate

Ethical clearance was obtained from the Institutional Review Board University of Gondar with ethical clearance number 2478/2014. To ensure confidentiality, consent was obtained from each study participant, as well as pregnant women under the age of 18 with the approval of her spouse or parents.

Availability of Data and Materials

The dataset is available from the corresponding author upon reasonable request.

Conflict of Interests

The authors declare that they have no conflict of interest.

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Authors' Contributions

W.T: prepared the proposal, designed the questionnaire, coordinated the process of data collection, involved in data cleaning and statistical analysis, and wrote the first draft of the manuscript.

T.A, H.T took part in preparing the proposal, participated in statistical analysis and manuscript reviewing and editing. All authors reviewed and approved the final manuscript.

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References

1. !!! INVALID CITATION !!!
2. Winter AK, Hegde ST. The important role of serology for COVID-19 control. *The Lancet infectious diseases*. 2020; 20: 758-759.
3. Gebre Eyesus FA, Tarekegn TT, Amlak BT, Shiferaw BZ, Emeria MS, Geleta OT, et al. Levels and predictors of anxiety, depression, and stress during COVID-19 pandemic among frontline healthcare providers in Gurage zonal public hospitals, Southwest Ethiopia, 2020: A multicenter cross-sectional study. *PLoS One*. 2021; 16: e0259906.
4. Zewudie A, Regasa T, Kebede O, Abebe L, Feyissa D, Ejata F, et al. Healthcare professionals' willingness and preparedness to work during COVID-19 in selected hospitals of southwest Ethiopia. *Risk Management and Healthcare Policy*. 2021; 14: 391-404.
5. Abdulah DM, Mohammed AA. The consequences of the COVID-19 pandemic on perceived stress in clinical practice: experience of doctors in Iraqi Kurdistan. *Romanian journal of internal medicine*. 2020; 58: 219-227.
6. Yesuf SM, Derseh BT, Girma D, Dejene TM. Work-related stress and associated factors among health professionals in zone 1, Afar region, Ethiopia. *Heliyon*. 2022; 8: e1267.
7. Girma B, Nigusie J, Molla A, Mareg M. Occupational stress and associated factors among health care professionals in Ethiopia: a systematic review and meta-analysis. *BMC Public Health*. 2021; 21: 1-10.
8. Pouralizadeh M, Bostani Z, Maroufizadeh S, Ghanbari A, Khoshbakht M, Alavi SA, et al. Anxiety and depression and the related factors in nurses of Guilan University of Medical Sciences hospitals during COVID-19: A web-based cross-sectional study. *International Journal of Africa Nursing Sciences*. 2020; 13: 100233.
9. Teshome A, Shegaze M, Glagn M, Getie A, Tekabe B, Getahun D, et al. Perceived stress and associated factors among health care professionals working in the context of COVID-19 pandemic in public health institutions of southern Ethiopia 2020. *PLoS One*. 2021; 16: e0252809.
10. Hasen AA, Seid AA, Mohammed AA. Anxiety and stress among healthcare professionals during COVID-19 in Ethiopia: systematic review and meta-analysis. *BMJ open*. 2023; 13: e070367.
11. Kim SC, Quiban C, Sloan C, Montejano A. Predictors of poor mental health among nurses during COVID-19 pandemic. *Nursing Open*. 2021; 8: 900-907.
12. Gelaye B, Lemma S, Deyassa N, Behretibeb Y, Tesfaye M, Berhane Y, et al. Prevalence and correlates of mental distress among working adults in Ethiopia. *Clinical practice and epidemiology in mental health: CP & EMH*. 2012; 8: 126.
13. Jacobs N, Coetzee D. Mental illness in the Western Cape Province, South Africa: A review of the burden of disease and healthcare interventions. *South African Medical Journal*. 2018; 108: 176-180.
14. Atamenta T, Cherie A, Alemu W. Time to death and its predictors among adult patients with COVID-19: A retrospective cohort study in Ethiopia. *Frontiers in Epidemiology*. 2023; 2: 1065184.
15. Tesfay FA, Aga FB, Teshome GS. Determinants of neural tube defect among children at zewditu memorial hospital, addis ababa, ethiopia a case control study. *International Journal of Africa Nursing Sciences*. 2021; 15: 100318.
16. Tsegaye BS, Andegiorgish AK, Amhare AF, Hailu HB. Construct validity and reliability Amharic version of perceived stress scale (PSS-10) among Defense University students. *BMC psychiatry*. 2022; 22: 691.
17. Chaaya M, Osman H, Naassan G, Mahfoud Z. Validation of the Arabic version of the Cohen Perceived Stress Scale (PSS-10) among pregnant and postpartum women. *BMC psychiatry*. 2010; 10: 1-7.
18. Dai Y, Hu G, Xiong H, Qiu H, Yuan X. Psychological impact of the coronavirus disease 2019 (COVID-19) outbreak on healthcare workers in China. *Medrxiv*. 2020.
19. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International journal of environmental research and public health*. 2020; 17: 1729.
20. Chekole YA, Minaye SY, Abate SM, Mekuriaw B. Perceived stress and its associated factors during COVID-19 among healthcare providers in Ethiopia: a cross-sectional study. *Advances in Public Health*. 2020; 2020: 1-7.
21. Christie A, Henley SJ, Mattocks L, Fernando R, Lansky A, Ahmad FB, et al. Decreases in COVID-19 cases, emergency department visits, hospital admissions, and deaths among older adults following the introduction of COVID-19 vaccine—United States, September 6, 2020–May 1, 2021. *Morbidity and Mortality Weekly Report*. 2021; 70: 858.
22. Madebo WE, Yosef T, Tesfaye M. Assessment of perceived stress level and associated factors among health science students at Debre Birehane University, North Shoa Zone of Amhara Region, Ethiopia. *Health Care: Current Reviews*. 2016; 4: 1-9.
23. Gadermann AC, Thomson KC, Richardson CG, Gagne M, McAuliffe C, Hirani S, et al. Examining the impacts of the COVID-19 pandemic on family mental health in Canada: findings from a national cross-sectional study. *BMJ open*. 2021; 11: e042871.
24. Polverino F. Cigarette smoking and COVID-19: a complex interaction. *American journal of respiratory and critical care medicine*. 2020; 202: 471-472.
25. Ermasova N, Cross AS, Ermasova E. Perceived stress and coping among law enforcement officers: An empirical analysis of patrol versus non-patrol officers in Illinois, USA. *Journal of Police and Criminal Psychology*. 2020; 35: 48-63.
26. O'Donovan G, Blazeovich AJ, Boreham C, Cooper AR, Crank H, Ekelund U, et al. The ABC of Physical Activity for Health: a consensus statement from the British Association of Sport and Exercise Sciences. *Journal of sports sciences*. 2010; 28: 573-591.