Mutah University
College of Graduate Studies

Work-Related Stress among Medical Staff Working in COVID-19 Frontline Care at the Royal Medical Services

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Thesis submitted to the College of Graduate Studies in Partial Fulfilment of a the Requirement of Master Degree in Public Health/Health Management, Department of Public Health. Faculty of Medicine

Mutah University, 2023

الآراء الواردة في الرسالة الجامعية لا
تعبر بالضرورة عن آراء جامعة مؤتة

MUTAH UNIVERSITY
College of Graduate Studies

جامعة مؤتــة
كلية الدراسات العليا

قرار إجازة رسالة جامعية

تقرر اجازة الرسالة المقدمة من الطالب امنه فهيد خليل الفليح

والموسومة بـ:

Work related Stress among medical staff working in COVID-19 frontline care at the Royal Medical Services

استكمالا لمتطلبات الحصول على درجة الماجستير في إدارة الصحة العامة

التخصص: إدارة الصحة العامة في تاريخ 2023/01/18

من الساعة 10 إلى الساعة 12 قرار رقم 10/2022

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Dedication

To my loving parents, who have been a source of encouragement and inspiration to me throughout my life, a very special thanks for teaching me many ways in which, throughout my life, you have actively supported me in my determination to find and realize my potential and to fulfill part of my dream, who has never left my side and stood by me in all difficult times, for his practical and emotional support.

To my beloved sisters and my beloved brothers for being so supportive.

To all my beloved friends, who have been so supportive along the way of doing my thesis.

Acknowledgement

In the Name of Allah, the Most Merciful and the Most Compassionate, all praise be to Allah, the Lord of the worlds; and prayers and peace be with Mohamed His servant and messenger.

First, I must acknowledge my limitless thanks to Allah, the Ever-Magnificent; the Ever-Thankful, for His help and blessing I am sure that this work would never have become true, without His guidance.

I express my special thank and gratitude to my supervisor, Prof. Dr. Ashraf Zaghloul, for his energetic encouragement, guidance, patience, and help through this study, who has been always generous in his time and effort during all phases of the research.

Also, additional thanks are extended to all professors in the Department of Public Health of the Faculty of Medicine at Mutah University and all those who have taught me for their help and support throughout my studies.

I would like to express my thanks to the Royal Medical Services for providing the facilities to conduct this study at the COVID-19 hospitals. I also would like to thank all health staff who participated in this study.

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List of abbreviations

Health Care workers	HCWs
ERI	Effort Reward Imbalance
Corona-Virus Disease	COVID-19
Personal Protective Equipment	PPE
Royal Medical Services	RMS
Health and Safety Executive	HSE
World Health Organization	WHO
Ministry of Health	MoH
Statistical Packages of Social Sciences	SPSS
National Institute for Work-related Safety and Health	NIOSH
Effort Reward Imbalance	ERI
Job Demand-Control	JDC
Intensive care unit	ICU
Institutional Review Board	IRB
personal protection equipment	PPE
standard deviation	SD
Severe acute respiratory syndrome	SARS
Burnout Measure-Short	BMS
General Self-Efficacy Scale	GSES
Short Index of Job Satisfaction	SIJS
community mental health care workers	CMHW

Abstract

Work Related Stress Among Medical Staff Working in COVID-19 Frontline Care at the Royal Medical Services

Background: Work-related stress among HCWs has become one of the most serious health concerns in the present health sector, COVID-19 increased workload, burnout, insufficient supplies, risk of infection, ethical dilemmas regarding which patients should be prioritized and developed serious psychological distress among healthcare workers.

Objectives: To determine the level of work-related stress among Jordanian nurses in quarantine isolation hospitals at Royal Medical Services, who care and care for patients with COVID-19, and to identify factors that are associated with perceived HCWs' work related stress.

Methods: A cross-sectional study was conducted based on a self-administered data collection sheet in selected hospitals in Royal Medical Services (RMS), using the Health and safety executive (HSE) questionnaire among Jordanian healthcare workers (physicians, pharmacists, nurses, and other allied health professions). HSE consists of 35 statements regarding working conditions (divided into six dimensions) with five possible answers, each on a Likert scale.

Results: A total of 642 participants from HCWs of physicians (16.2%, n=103), nurses (68.8%, n=442), pharmacists (10%, n=64) and other allied health professions (5%, n=33). The mean age of the HCW was 32.36± 0.6. Although the total score for all dimensions of work-related stress among HCWs was (2.72±0.37), the total scores among nurses, physicians, pharmacists and allied HCWs were (2.40, 2.77, 2.94, and 2.91), respectively. The dimension of work stress had the highest score (1.97). Several predicted factors were significantly associated with increased of work related stress which include; females, nurses, aged (>36 years), single nurses, education level, department of the intent care unit (ICU), long working hours, and assigned to more patients.

Conclusion and recommendations: severe work related stress was found among HCWs working in COVID-19 front-line care at the RMS. It is highly recommended to increase managerial support and staff communication, and also decrease workplace demands, which could reduce work-related stress during COVID-19outbreak.

Keywords: work, related, occupational, stress, health workers, and COVID-19.

الملخص

التوتر المرتبط بالعمل بين الطاقم الطبي العامل في رعاية مرضى كورونا-19 في الخدمات الطبية الملكية

المقدمة: التوتر المرتبط بالعمل بين كوادر العاملين المباشرين في مجال الرعاية الصحية أصبح أحد أكثر المشكلات الصحية خطورة في القطاع الصحي الحالي، حيث زاد فيروس كورونا من عبء العمل، والإرهاق، وعدم كفاية الإمدادات ، وخطر العدوى ، والمعضلات الأخلاقية فيما يتعلق بالمرضى الذين يجب منحهم الأولوية كل ذلك ادى الى حدوث ضغط نفسي لدى العاملين في القطاع الصحي.

الهدف من الدراسة: لتحديد مستوى التوتر المرتبط بالعمل بين العاملين في مجال الرعاية الصحية الأردنيين في مستشفيات عزل الحجر الصحي في الخدمات الطبية الملكية، الذين يتعاملون مع مرضى كورونا-ويعتنون بهم ، ولتحديد العوامل المرتبطة بالإجهاد المرتبط بعمل العاملين في مجال الرعاية الصحية.

الطريقة: تم إجراء دراسة مقطعية بناءً على استبيان تم إجراؤه ذاتيًا في المستشفيات المختارة في الخدمات الطبية الملكية باستخدام استبيان تنفيذي الصحة والسلامةبين العاملين في مجال الرعاية الصحية الأردنيين (الأطباء والصيادلة والممرضات والمهن الصحية الأخرى)، يتكون من (35): 642 مشاركًا من العاملين في مجال الرعاية الصحية من الأطباء (16.2٪ ، العدد = 103) (68.8 = 442) ، الصيادلة (10٪ ، العدد = 64) (5 = 33)، كان متوسط عمر المشاركين 32.36 ± 0.6. الدرجة الإجمالية لجميع أبعاد التوتر المرتبط بالعمل بين العاملين في مجال الرعاية الصحية كانت (2.72 ± 0.37) ، فإن إجمالي الدرجات بين الممرضات والأطباء والصيادلة والعاملين في مجال الرعاية الصحية المتعاونين كانت (2.40 و 2.77 و 2.94 و 2.91) ،بالترتيب. (1.97). ارتبطت العديد من العوامل المتوقعة بشكل كبير مع زيادة الضغط المرتبط بالعمل والتي تشمل؛ الإناث، والممرضات، والأعمار (< 36 عامًا)، والعاملون في الرعاية الصحية غير المتزوجين، والمستوى التعليمي، والعمل في قسم العناية المركزة، وساعات العمل الطويلة، والمخصصين لعدد أكبر من المرضى.

الخلاصة والتوصيات: تم العثور على ضغوط شديدة مرتبطة بالعمل بين العاملين في مجال الرعاية الصحية العاملين في رعاية مرضى كورونا-19 في الخطوط الأمامية في الخدمات الطبية الملكية. يوصى بشدة بزيادة الدعم الإداري وتواصل الموظفين، وكذلك تقليل متطلبات مكان العمل، مما قد يقلل من الضغط المرتبط بالعمل أثناء تفشي فيروس كورونا.

الكلمات الرئيسية: التوتر المرتبط بالعمل، فيروس كورونا-19، العاملين في القطاع الصحي.

Chapter One
Research Background

1.1 Introduction:

Work-related stress or occupational stress can be defined as; the harmful physical and emotional reactions that happen when the needs of the job do not match the abilities, resources, or needs of the worker (Brunero et al., 2006; NIOSH, 2008). While, stress is the body's physiological or psychological behavioural adjustment according to circumstances (Nakao, 2010). Stress is an integral part of the jobs of health care workers (HCWs), due to the work environment and their responsibility for the health and treatment of patients (Zare et al., 2021).

Work-related stress is a predictable problem among healthcare workers, who are well known to score high levels of work-related stress (Sharma et al., 2014). Work-related problems were the most frequent stressors, followed by health-related problems, and finally financial problems. Healthcare workers are daily subjected to a high level of work-related stress as they face suffering, grief, and death thus, during the pandemic, HCWs are suffering from work-related stress (Sanlturk, 2021). In 2019, according to the American Institute of Stress, approximately 83% of workers suffered work-related stress in the United States (American Institute of Stress (AIS), 2019).

Stress causes negative physiological effects on health such as fatigue, headache, gastrointestinal, decreased immunity, anxiety, and insomnia (Reardon et al., 2020; Nakao, 2010). Occupational stress is considered a major cause of work-related staff turnover, and absenteeism (Bernal et al., 2015). In addition to reducing work quality, interpersonal disorders, and family conflicts (Khaghanizadeh et al., 2008), it has been estimated that high levels of stress at work caused workers to lose 10.8 million working days in 2010/11 (Health and Safety Executive, 2011a).

In addition to work stress, the COVID-19 pandemic caused increased workload, physical burnout, insufficient, high risk of infection, and ethical decisions regarding patients to be prioritized, which resulted in serious psychological stress among nurses (Pappa et al., 2020; Mokhtari et al., 2020). Previous Studies have shown that during previous infectious epidemics like; severe acute respiratory syndrome SARS in 2003, HCWs were negatively influenced by fear of infection and of transmitting it to family and colleagues. Also, feeling of uncertainty and stigmatization were obvious for HCWs (Maunder et al., 2003).And the middle east respiratory syndrome coronavirus (MERS-CoV) outbreaks in 2012, psychological

problems are produced such as work stress, sleep disorders, burnout, anxiety, and depression among healthcare workers (Khalid et al., 2016).

In December 2019, the outbreak of coronavirus disease (COVID-19, SARS-CoV-2019) in Wuhan, China started and then spread around the world (Liu et al., 2021). The World Health Organization (WHO) declared COVID-19 a global pandemic in March 2020. More than 437 million cases and the death of more than 5.9 million (World Health Organization, 2022). In Jordan, until March 2022 the total confirmed was of COVID -19 cases more than 1.6 million, and more than 13 thousand deaths (Ministry of Health, 2022).

In Jordan, the Jordanian Ministry of Health (MoH) and the National Epidemic Committee, as well as the RMS, established the Defence Law and national strategic plan to confront the COVID-19 pandemic (Alqutob et al., 2020). Selected and equipped hospitals were designated to care for and treat confirmed cases of COVID-19, and new hospitals were also built with personal protection equipment (PPE), trained personnel, and mechanical ventilator devices (Alhalaiqa et al., 2021). Additionally, the workload, work hours, and stress of the front line nurses who dealt with COVID-19 patients increased.

In addition, other HCWs are the front line of the pandemic, as with the ongoing pandemic and different virus waves and mutations, they are prone to unprecedented work stress and increased burden. Furthermore, they experience highly stressful situations during the COVID-19 epidemic that could be associated with negative emotional outcomes. Consequently, nurses need adequate psychological care and support from organizations and social support (Smith, 2020; Zare et al., 2021).

However, the studies revealed that the Jordanian HCWs who directly deal with patients suspected or confirmed to be infected with COVID-19 had different levels of stress, which are considered high levels of stress (Alhalaiqa et al., 2021). Likewise, in a study among Jordanian HCWs,35% of the participants had shown extremely severe distress, also a high level of stress (Alnazly et al., 2021).

In addition, in northern Jordan, Boran et al., (2012) found high levels of job stress among 402 health care professionals, the General Health Questionnaire (GHQ-12) has been used to assess job stressors, and GHQ mean scores were the highest among general practitioners (2.8), where the highest stress scores were among women, heavy workloads, and long working hours.

Previous COVID19 studies in literature generally focused on patient medical treatment. On the contrary, nurses have experienced psychological

health problems and work-related stress. Therefore, the stress related to work of HCWs is worthy of attention during the epidemic. The purpose of this study is to determine the level of work-related stress among HCWs during the COVID-19 pandemic and the factors associated with work-related stress among hospital workers who care for and caring patients with COVID-19.

1.2 Significance of the study:

Work-related stress or occupational stress among HCWs has become one of the most serious health concerns in the present health sector. Many studies have shown that HCWs experience high levels of work-related stress associated with individual, social, environmental, and organizational factors. Work-related stress has an impact on physical well-being which can cause hypertension, cardiovascular problems, reduce immunity, contribute to reduce enjoyment in life, and reduce the overall status of mental health (Bhatia et al., 2010). According to Alnazly et al. (2021) the HCWs had a high level of psychological distress and long working hours were observed that were related psychological pressure and burnout among HCWs. In addition, the burden of the COVID-19 pandemic, HCW who work at critical words such as COVID-19 and have a higher workload were associated with more stress related to work (Alhalaiqaet al., 2021). Work-related stress and increased workload were found to be associated with an increase in depressive symptoms (Deguchi et al., 2013b). Additionally, eliminating work-related stress in HCWs' daily lives, by providing social support, can lower psychological distress symptoms (Ta'an et al., 2020).

Rational:

Stress is a multifaceted phenomenon that results from the interaction between an individual and the situation in which the person exists (Al-Hawajreh, 2011). The most recent HSE report (2021) gives a prevalence of822,000 workers suffering from work-related stress, depression, or anxiety, with a prevalence rate of 2,480 per 100,000 workers (HSE report, 2021b).

Furthermore, in 2020 and 2021 the rate of work-related stress in UK was higher than the levels of 2018 and 2019 before coronavirus; also, health professionals’ occupation was higher than the average rate of work stress, depression or anxiety according to health and Safety Executive report (HSE, 2021).

Therefore, there may be significant differences in work-related stress among health workers due to different work settings. Studies were conducted to examine work-related stress or occupational stress among

nurses in different areas and its associated stressors or factors in Jordan, this study is to measure the work related stress levels and their associated and predictors factors among quarantine nurses who deal with and direct caring patients with COVID-19 in Royal Medical Services hospitals (RMS) in Jordan, the results of this study can be used to direct policymakers and managers to develop a stress prevention model (prevention, management, and control of work related stress) specific to Royal Medical Services hospitals and equivalent Jordanian health services situations.

1.3 Research questions of the study:

1. What is the level of perceived work-related stress among Jordanian HCWs working in quarantine areas for COVID-19 patients in RMS hospitals?
2. What are the sociodemographic predictors for work related stress among Jordanian HCWs working in quarantine areas for COVID-19 patients in RMS hospitals?
3. What are the predictor factors that are associated with work-related stress among Jordanian HCWs working in quarantine areas for COVID-19 patients in Royal Medical Services hospitals?

1.4 Objects of the Study:

General Objective:

Determine the level of work related stress among Jordanian nurses in quarantine isolation hospitals who deal and care for patients with COVID-19 and to identify factors that are associated with perceived stress from nurses.

Specific Objectives:

1. Determine the prevalence of work related stress among Jordanian healthcare workers in quarantine isolation hospitals who care for patients with COVID-19.
2. To explore the relationship between work-related stress and socio-demographic factors among Jordanian nurses in quarantine isolation hospitals that care for patients with COVID-19.

Chapter Two
Review of the literature

2.1 Theoretical framework

Stress is the nonspecific response of the body to any demand placed on it (Harshana, 2018). Stress refers to conditions in which a person's well-being is negatively affected by the failure to cope effectively with the surrounding needs (Erkutlu & Chafra, 2006). Additionally, Laposa et al. (2003) defined stress as a psychobiological body reaction to physical or psychological needs that threaten the individual's well-being. Work-related stress according to HSE is defined as a harmful reaction that people have to excessive pressures and demands placed on them at work (HSE b, 2015). Tsai and Liu (2012) suggested work-related signs and symptoms of stress nervousness, nightmares, irritability, headaches, insomnia, and gastrointestinal. Bedside of high absenteeism, high turnover, poor relationships, and poor quality of health-promoting lifestyle behaviours.

There are many models and theories of work-related stress and general stress, for a better understanding of the mechanisms of work-related stress among HCWs, the stress model and transactional theory were used as the theoretical framework of this study.

Stress Models

A traditional model describes stress as a specific level of perception that leads the worker's mind to an end where he or she will believe that he or she is unable to cope with the work, ultimately resulting in fatigue. The 'bucket model' also describing the fatigue condition of a worker that leads to experiencing unpleasant experiences by linking the human body to a bucket full of unpleasant experiences (Harshana, 2018).

Person-Environment Fit Theory

An interactional theory of work-related psychological distress, suggests that work related stress results from a lack of fit between the individual's skills, resources, and abilities, and the demands of the work environment, interactions occur between objective realities and subjective perceptions and between environmental variables and individual variables. Therefore, stress can occur when there is an absence of fit between the attitudes and abilities to meet the demands of the job or the level to which the work environment meets the needs (Caplan, 1987; French, Caplan & Harrison, 1982).

Transactional Theory

Transactional theory suggests that stress is the direct outcome of a transaction between an individual and their environment, which may burden and exhaust their resources and consequently threaten their well-being (Lazarus, 1986; Lazarus & Folkman, 1987).

When a worker is exposed to particular workplace situations, a person's assessment of a difficulty in coping, with this experience is usually associated with attempts to deal with the underlying problem and with changes in psychological functioning, behaviour, and function. Threatening and challenging situations are perceived to potentially result in harm (Lazarus, 2006). Individual capabilities are influenced by a number of factors such as; personality, situational demands, coping skills, previous experiences, and any current stress state already experienced (Prem et al. 2017).

Job Demand Control (JDC) Theory

Work-related stress can result from the interaction between several psychological work needs related to workloads such as cognitive and emotional demands, interpersonal conflict, job control relating to work-related decisions, and work related skills used (Karasek, 1979). When workers experience high demands with low control, they can experience work-related psychological distress (Beehr et al. 2001).

A cross-sectional observational study to explore the occupational stress among pediatric and adult critical care personnel during the COVID-19 pandemic in Jordan, using online and written questionnaires to measure psychological distress (quantitative findings) and open-ended questions with free text boxes (qualitative findings). Work-related stress according to a model adopted in the study was explained due to interaction between HCW and their work environment and pandemic work conditions in the ICU that agree with the person-environment fit model (PE-Fit). Also, found low work-related well-being as workers have a high workload combined with a low level of control over their work, which matches with the job demand control model (Feeley et al, 2021).

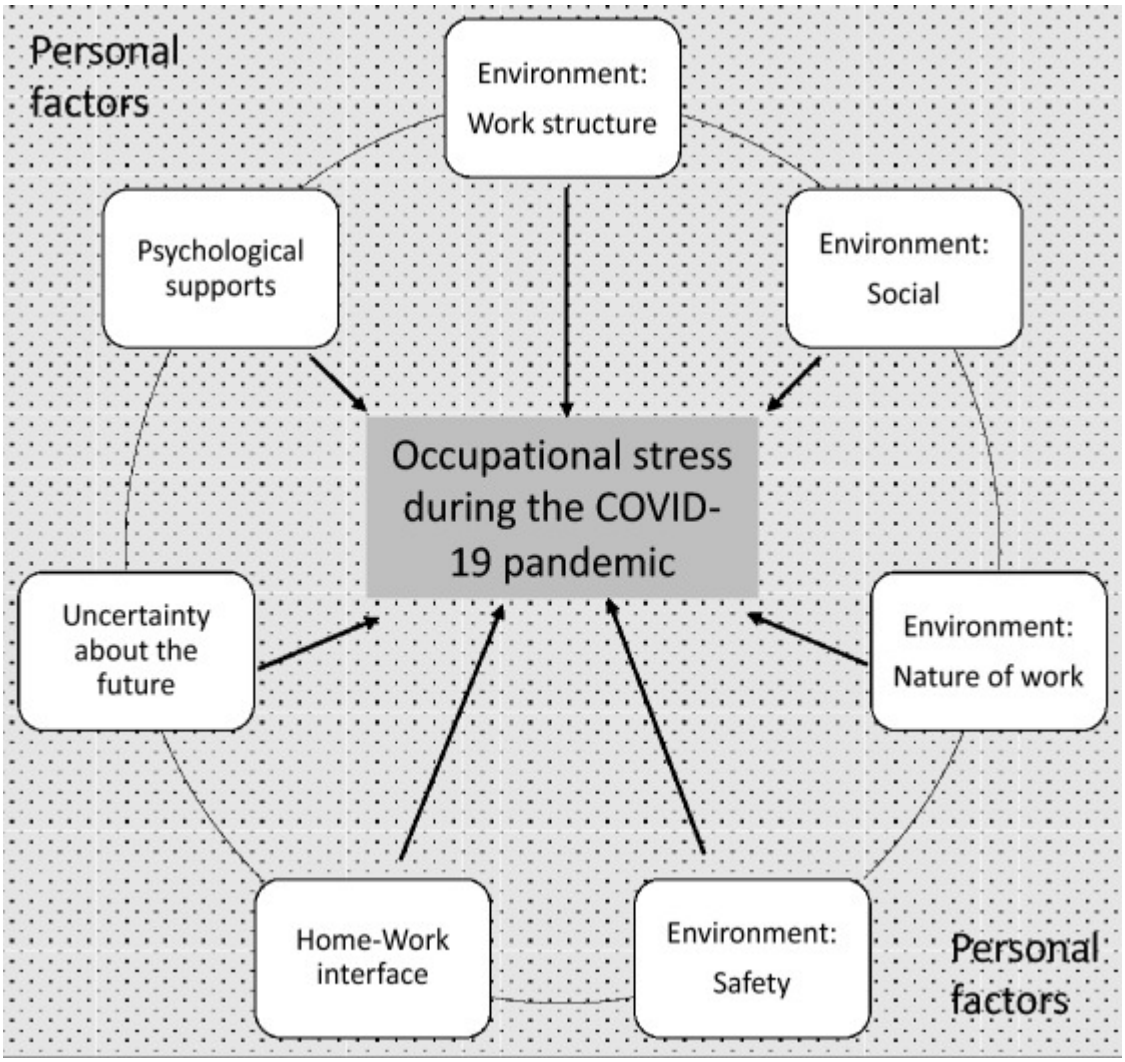

Figure No. (2.1): A model of work-related stress during the COVID-19 pandemic (Feeley et al., 2021).

2.2 Royal Medical Services (RMS)

The RMS is one of the public health sectors in Jordan. In addition to the Ministry of Health, the RMS provides primary care through field and portable clinics. In addition, it provides secondary and tertiary health care services through comprehensive medical centres. It has 15 hospitals (six specialists and ten generals), and the total number of hospital beds in RMS is more than 3476 (23.5%) of hospital beds in Jordan for the year 2017, which are distributed in different governance throughout Jordan (MoH, 2017).

Through the spread of the COVID-19 virus worldwide, RMS introduced its expertise to include the spread of the virus in Jordan by creating various initiatives; first, it created the RMS COVID-19

committee, which supervised the country's overall response. Second, the RMS created its risk assessment tool to help control the spread of disease. Third, it created a 24/7 operation room for database and medical record collection, addressed in the RMS and linked directly to all central and peripheral hospitals and primary medical centres (https://jrms.jaf.mil.jo.).

The RMS also in cooperation with both public and private hospitals established a protocol for triaging emergency cases and diagnose suspected cases. The RMS created special COVID-19 mobile field hospitals in the major cities of Amman, Irbid, and Aqaba to screen all Jordanians and foreign arrivals. Additionally, fully equipped with top-notch ICUs, adequate protective tools, and leading respiratory consultants (JRMS, 2021).

2.2.1 Royal Medical Staff:

One of the health workers is from RMS and it is considered the main provider sector of health services in Jordan.

Table (1): Distribution of the health workforce in the RMS sector by category, according to the Annual Report of the National Human Resources for Health Observatory, 2017.

Table No. (2.1): Distribution of the health workforce in the RMS sector by category

Cadre	
Physicians	1997
Dentists	426
Pharmacists	327
Registered nurses	4258
Midwives	344

Table No. (2.2): Health workforce in RMS by category and gender, 2017

Cadre	Gender				Total
	Male	%	female	%	
Physicians	1639	82%	358	18%	1997
Dentists	263	62%	163	38%	426
Pharmacists	85	26%	242	74%	327
Registered nurses	1416	33%	2842	67%	4258
Midwives	-	-	344	100%	344
Total	3318	47%	3605	53%	6923

RMS services are distributed over ten Jordanian governorates, the highest percent of HCWs were present in the Amman governorate, followed by the Irbid and then Zarqa governorates, while the least were present in the Madaba governorate.

2.3 Scales for Stress Assessment

A cross-sectional study was conducted in Iran to assess work-related stress among290 medical personnel, including nurses, physicians, and hospital cleaning crews facing COVID-19 patients using the HSE questionnaire, developed in the 1990s by the UK Health and Safety Institute to measure occupational stress and included 35 questions and 7 areas. The study results showed high stress levels among the participants; 87% of nurses, 79% of the cleaning crew, and 67% of physicians had high levels of stress. Additionally, the factors that had the greatest impact on the stress levels were manager support, communication between nurses, and workplace demand. Therefore, reducing the level of staff in hospitals during the outbreak of COVID-19 should improve communication between people working in hospitals, increasing managers' support for staff, and reduce workplace demands and workload (Zare et al., 2021). The six dimensions with a numerical value of the HSE questionnaire, a serious situation that requires immediate corrective action, and whose values are below the 20th percentile. A clear necessity for corrective action, with values below but above the 50th percentile. The presence of a good level of performance; however, requires interventions with a score between the 50th and 80th percentiles. An optimal situation with the satisfaction of the management standard with a score greater than the 80th percentile must be maintained over time (Tomie et al., 2016).

An online cross-sectional survey was conducted during the COVID-19 outbreak to investigate disease-related occupational stress and its effect on mental health and self-efficacy among 536 community mental health care workers(CMHWs).Participants provided COVID-19-related work information and to assess the severity of depressive symptoms used the Patients' Health Questionnaire Depression Module(PHQ-9), to assess the severity of anxiety symptoms the General Anxiety Disorder-7 (GAD-7) was used, and to evaluate the level of perceived self-efficacy, the General Self-Efficacy Scale (GSES) was used. The results reported that CMHWs had different degrees of depressive symptoms, those under 30 years of age were more likely to develop depressive symptoms. Additionally, few CMHW reported anxiety symptoms, while quarantined

HCWs had a higher risk and severity of depression and anxiety symptoms. Online psychological assistance was a protection factor for self-efficacy and the effect of occupation stress had a potential negative association causing severe psychological impacts, and suggested that reasonable job assignment and concluded that organizational support is a necessary safeguard for chinses HCWs (Sun et al., 2021).

A cross-sectional study was conducted between February 2021 and June 2021 using a structured questionnaire among 212 HCW and police persons. The results indicated that the HCWs and police personnel face work-related stress irrespective of gender and marital status; also, the work-related stress did not vary according to age and job description. Additionally, showed that work-related stress significantly impacts the psychological well-being of healthcare workers and police personnel (Ravikumar, 2022).

In addition, a study was conducted in Italy to investigate the impact of the COVID-19 pandemic and work-related stress among HCWs, and to explore the relationship between sociodemographic and work-related factors. Data were collected using BIAS 20 questionnaire to report the level of requests and resources, perceived stress, the impact of stress on health and the functional level of stress ranging from 1 to 10 points scale, and the Depression Anxiety Stress Scales (DASS-21) included three sections: stress, anxiety, and depression. Each with 7-point scales, the final score of each part was obtained by summing the scores of the related questions - each item scored from 0 (absolutely disagree) to 3 (absolutely agree). Cut-off scores > 9, >7, and > 14 represent a positive screening for depression, anxiety, and stress, respectively. The results of the study revealed that biological risk at work, and more among those working in hospitals, also, stress symptoms and anxiety were significantly associated with a younger age group, less work experience, and post-graduate education. Likewise, working as an independent contractor was a risk factor for high-stress health impacts. However, the study showed that males and women experience stressors in similar ways and demonstrated that frontline nurses who worked in direct contact with patients with COVID-19 patients had greater psychological distress (Paolocci et al., 2021).

The cross-sectional survey investigated the occupational and health conditions of anesthesiologists in a COVID-19 hospital in Latium, Rome, occupational stress was assessed using the Effort Reward Imbalance (ERI) questionnaire consisting of 10 items with responses ranging on a four-point Likert scale from “1 = strongly disagree’ to “4 = strongly

agree". The effort subscale was based on three questions (for example, 'I'm always under pressure for the workload"); the total score ranged from 3 to 12. The reward subscale was based on seven questions (eg 'Considering all my efforts and what I have achieved, I receive the respect and prestige I deserve at work"); consequently, this score ranged from 7 to 28. The study found that a significant percentage of participants (71.1%) reported high levels of work-related stress, with an imbalance between high effort and low rewards, and also reported symptoms of insomnia, anxiety, and depression among participants (Magnavita et al., 2020).

In addition, a cross-sectional online survey study was performed to examine work-related stress and anxiety as a response to COVID-19 among a total of 1,023 HRC in South Korea, using the 9-item stress and anxiety scales of viral epidemics (SAVE-9) and 7-item generalized anxiety disorder-7 (GAD-7). The study results showed that the nurses had high levels of stress and anxiety about the viral infection, and nursing, female, professionals, junior and single workers reported higher levels of depressive symptoms, stress, and anxiety (Ahnet al., 2021).

Furthermore, a study was performed to identify predictors of work-related stress during the COVID-19 pandemic according to work modality (face-to-face or teleworking); the sample consisted of 328 HCWs, and work related stress was evaluated through six items of the Stress in General Scale for each work modality. The results showed that work-related stress correlated significantly with perceived economic threat, females, work-family conflict, and work hours in both work modalities. Among face-to-face HCWs, work-family conflict, and security measures explained the increased work stress. Also, HCWs who are teleworkers have felt more protected (Soubelet-Fagoaga et al., 2022).

Another cross-sectional study was conducted to analyze the relationship between individual and work factors and the level of work stress among 135 respondents of health office employees during the COVID-19 pandemic. The study used two instruments; the depression, anxiety, and stress scale 42 (DASS-42) and the generic NIOSH (National Institute of Occupational Safety and Health) stress questionnaire instrument. The results revealed that most of the participants (86%) did not experience work stress, (7 %) had moderate work stress, and (6%) had mild work stress. Also, it showed that workload was the most significant factor affecting work stress, and social support was also a dominant factor with work stress, although most of the participants (55%) had received good social support (Adhi & Cristenzein, 2021).

Similarly, in Jordan, a study was conducted to assess the prevalence of burnout at work and levels of job satisfaction among physicians using a mixed method that used a structured Web-based questionnaire and semi-structured interviews. Short-term 10-Item Burnout Measure (BMS) and the 5-Item Short Index of Job Satisfaction Index (SIJS) were adopted. The study showed a high prevalence of work burnout among physicians, factors that were significantly associated with work burnout were; female, working in highly loaded hospitals, long working hours, night shifts, lack of PPE, and being positively tested for COVID-19 (Alrawashdehet al., 2021).

Summary

The studies reported that work-related stress during the COVID-19 pandemic had a negative psychological impact on HCWs, and was highly associated with their sociodemographic characteristics and work environments. In addition, occupation and workplace differences are important factors. Studies revealed that women, nurses, and frontline HCWs directly involved in the diagnosis, treatment, and care of patients with COVID-19 are particularly susceptible to mental health symptoms.

Psychological, mental and work exhaustion are not only a burden on nurses, but could influence society as a whole, by threatening health care services and subsequent severe staff shortages. Therefore, it is important to establish a process for psychological assessment and intervention process to support HCWs affected by epidemics.

2.4 Conceptual framework

The conceptual framework of this research explains the constituents of dependent variables that include work-related stress during the COVID-19 and independent variables including the socio-demographic characteristics (age, sex, monthly income, marital status, and educational level) and working characteristics (job title, years of experience, COVID-19 infection, working hospital, and working daily hours) on work-related stress during the COVID-19 (Figure 2.2).

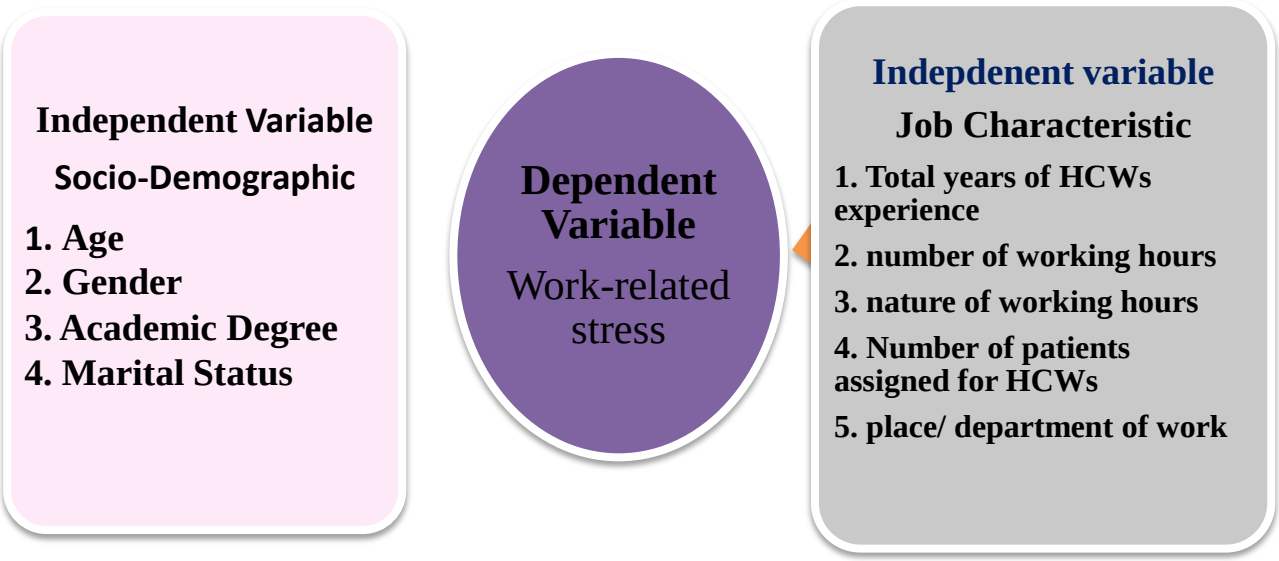

Figure (2.2)
The conceptual framework for work-related stress and the effects of sociodemographic and job characteristics.

2.5 Hypotheses of the Study:

H1: Overall scores of work-related stress will be high among HWs (including physicians, nurses, and pharmacists) during COVID-19.

H2: There is a statistically significant association between work-related stress scores in the sociodemographic data p value = 0.05.

H3: There is a statistically significant association between work-related stress scores in the general participants and job characteristics at a p-value = 0.05.

Chapter Three
Methodology

3.1 Study Design

A cross-sectional descriptive study.

3.2 Study Setting

The study was carried out in RMS quarantine hospitals designated and assigned to treat suspected and treat confirmed patients with COVID-19, which increased the capacity of the hospitals, including isolation and ICU rooms, in light of a spike in the number of cases of COVID-19. The hospitals selected in this study were as follows:

1. Queen Alia Military quarantine hospital
2. First military field hospital in Zarqa.
3. Military field hospital in Irbid.

3.3 Study population:

3.3.1 Sampling Technique

The sampling technique was used random stratified sample of Jordanian HCWs was used. The study population was Jordanian healthcare workers (physicians, pharmacists, nurses, and other allied health professions) in the hospitals mentioned hospitals, who dealt with suspected and confirmed cases of COVID-19 or their contacts and worked in RMS; and who was willing to participate in the study voluntarily during the study period.

Inclusion Criteria: Inclusion criteria for participation were: 1) being a healthcare worker, 2) working in RMS quarantine hospitals, 3) providing care for COVID-19patients or their contacts at the time of the survey, and 4) male and female Jordanian HCWs aged ≥22 years. Nurses include registered nurses and associates, doctors, pharmacists, and allied health professions.

Exclusion criteria: 1) HCWs who were not dealing with COVID-19 patients,2) HCWs unwilling to participate in the study voluntarily, 3) HCWs work in other non-COVID words, and 4) students during the study period.

Table No. (3.1) HCWs in the quarantine hospital under study

Hospital	Frequency
Queen Alia military hospital	1256
First Military Field hospital in Zarqa	1212
Second Field Military hospital in Irbid	1630
Total	4098

3.3.2 Sample size

The total population of the different professions was approximately 4098 people (physicians, nurses, pharmacists, and other professions), according to the Open Epi software program version 3 (Drapeau, Marchand, Beaulieu-Prévost, 2012) with a confidence level of = 95 %, the error margin = 5.The calculated sample size was 352, and by adding 10% for the non-response rate, it became about 388 subjects.; the recruitment wasto802participants to overcome the missing or uncompleted data, HCWs under the study (n=642).

Table No. (3.2) Distribution of HCWs under the study

Category	Frequency
Physician	103
Staff Nurse	442
Pharmacist	64
Allied Health Professions	33
Total	642

3.3.3 Study Time

Recruitment took place from April 2022 to the target population in three hospitals (Queen Alia Military Quarantine Hospital, First military field hospital in Zarqa, and Military Field Hospital in Irbid).

3.4 Ethical Considerations

Ethical approval was obtained from the Institutional Review Board of Mut'ah University. In addition, ethical approval was obtained from the Institutional Review Board (IRB) scientific committee at RMS (Appendix 2). The rights of participants; confidentiality, privacy, and withdrawal were preserved.

3.5 Data collection procedure

The first page of the self-addressed questionnaire contained the information sheet explaining the purpose, procedure, and possible risks of the research study and the rights of participants, this is to ensure that the participants have adequate information about the purpose of the research and its benefits. Participants were informed that participation in the study is completely voluntary, the questionnaire did not contain any recognizing data, and participants are not required to write their names on their questionnaire. Each participant was assigned an ID number to ensure their right to anonymity and confidentiality. Additionally, it provided contact information for the researcher to potential participants.

Also, the consent form was obtained from each participant prior to data collection. The survey questionnaire took about 10minutestocomplete. No financial payments or incentives to participate.

3.6 Study Instrument

The demographic data was enveloped with questionnaires; age, sex, profession or specialty, working experience, working hours during COVID-19, place of residence, level of education and clinical area.

The Health and Safety Executive (HSE) Management Standards Indicator tool developed by UK Health and Safety Executive is a 35-item questionnaire relating to the six primary stressors identified in the management standards approach to tackling work related stress. The questions are based on the best available evidence linking work design to health outcomes to measure organizations' performance in managing the primary stressors identified by the HSE management standards.

The tool has been used to measure work-related stress across different work-related groups, with a clear relationship between the HSE tool and alternative measures of well-being. It consists of 35 statements regarding working conditions (divided into six areas) with five possible answers each on a Likert scale; never, rarely, sometimes, often, and always that cover working conditions considered potential causes of work-related stress. The cutoff point for the high-stress level was considered when comparing the mean dimensions of HSE in the study with The mean of the HSE benchmark; the mean scores below were considered low-stress level and potential causes of stress related stress.

Table No. (3.3) the scale options towards work-related stress dimensions

Scale	1	2	3	4	5
Options	never	rarely	sometimes	Often	always

The subscales were; the demands that include workload and work environment, control which evaluates the autonomy of the workers, support which is divided to support from managers and colleagues, quality of relationship which includes promotion of positive work to prevent conflicts and address unacceptable behaviors which verify the workers' awareness of their position in the organization, and change that evaluates organizational changes.

3.7 Reliability and validity of the HSE Questionnaire

Translating the questionnaire pack into Arabic and then back-translation to English by Arabic experts who were fluent in both the

English and Arabic languages, and checking against the original English version provides the chance for revisions to enhance the reliability and accuracy of the translated tool. Finally, when the two English versions were compared to validate the Arabic version, there was a high level of equivalence and it was subsequently used in this study (Appendix 3).
The validity was reported in the result of a study that showed a high correlation between items extracted from factor analysis and those extracted from the HSE questionnaire (0.92, 0.73, 0.75, 0.63, 0.87, 85, and 0.22 for item demands, control, managerial support, peer support, relationships, role and change, respectively). Also, reliability is %78 and %65 using the Cronbach's Alpha and split-half method, respectively (Marzabadi & Fesharaki, 2011).

3.8 Study variables

3.8.1 Independent variables

The independent variables included in the study were: sex (male, female), age, educational level (diploma degree, bachelor's degree, master's degree, and Ph.D. degree), marital status (single and married), total years of HCWs experience (1–5, 6–10, 11–15, 16-20 and more than 20 working years), number of working hours (8 hours, 12 hours and > 12 hours), nature of working hours (8 hours in the morning, three shifts, morning/evening shifts and 8 hours morning hours with shift), number of patients assigned for HCWs (1-5, 6-10, 11 and more), place of work/Department (ICU, Wards, Emergency room, Operation room, and others).

3.8.2 Dependent Variables

In the present study, the following terms were applied:
Work-related stress: The harmful physical and emotional reactions that occur when the needs of the job do not match the abilities, resources, or needs of the worker (Brunero et al., 2006).

3.8.3 Operational Definitions

Work-related stress: according to HSE is defined as a harmful reaction that people have to excessive pressures and demands placed on them at work (HSE b, 2015). It was measured by the HSE tool, there are six main areas of work design that can affect stress levels; demands, control, support, relationships, roles, and change.

3.9 Statistical analysis

Data entry was checked, coded and downloaded in an Excel form and entered into the SPSS programme version 25 (Chicago, IL, USA), then at a significance level of $p<0.05$, $p <0.05$, p-values for the trend in each group were reported and two-tailed to generate descriptive and inferential statistics. Descriptive statistics were used to describe sociodemographic and work-related characteristics; in terms of frequency, percentages, mean, median, and standard deviation. And also, the normal distribution of all quantitative variables of the present study was tested.

Difference tests between HCWs were used to describe mean differences in work related stress between different professions. Data were downloaded in an Excel form and inserted into the SPSS version 25 (Chicago, IL, USA), then analysed at a significance level of $p<0.05$, $p <0.05$, the p-values for the trend in each group will be reported and two-tailed to generate descriptive and inferential statistics. All variables in the present study had a normal distribution.

Difference tests were used which indicated to show the significant mean differences in work-related stress (dependent continuous variable) between healthcare workers who treat COVID-19 patients and to describe the mean differences in work-related stress between different professions. Multiple linear regression was used to determine the significance of predictor factors that could affect the work-related stress score among nurses.

Chapter Four
Results & Discussion

4.1 Introduction

This study aimed to determine the level of work-related stress among Jordanian nurses in quarantine isolation hospitals that deal and care for patients with COVID-19 patients, and also to investigate the factors that may impact stress among Jordanian HCWs working in quarantine areas for COVID-19 patients in RMS hospitals (Queen Alia Military Hospital (n=1256, 420 beds), the First Military Field Hospital in Zarqa (n=1212, 300 beds) and the Second Field Military Hospital in Irbid (n=1630, 300 beds).

This chapter begins with a summary of the demographic characteristics of the study sample followed by the statistical analysis used to answer the research questions and objectives.

4.2 Data Management

Before performing statistical analysis, data were selected to ensure that the sample data were suitable for performing inferential statistics and to identify missing, undefined, or outlier values using descriptive analysis and normal distribution for the scale-dependent variable. The results of the screened data revealed that there were no missing, undefined or outlier values.

4.3 Demographic characteristics

The study was conducted among healthcare workers in RMS hospitals designed for COVID-19 treatment. Questionnaires were sent through the human resources departments and through the head nurses of Royal Medical Services hospitals to a total of 642 participants who completed the questionnaires that were retrieved for analysis.

The sociodemographic characteristics and occupational characteristics of the nurses (n = 642) of the study participants are summarized in Table (4.1) below.

Table (4.1) shows that the total sample of nurses (n = 642) in this study included 442 nurses, 64 pharmacists, 103 physicians and 33 allied health professions. Regarding age, the majority of participant was those between age 30 to 34 years of age and were represented (45.8%, n=294), while the lowest percentage were accounted for group aged 40 years and older (9.3%, n=60).

More than two thirds of the workers in the study sample were females (77.1%) and also (78.1%) were married, according to the level of

education, most of the workers had bachelor's degrees (84.3%), while (5.6 %) had a Ph.D. degree.

According to specialties, the highest percentage was nurses (68.8%), while the lowest percentage was other allied health professions (5.2%). Regarding the place, number, and schedule of working hours, two thirds of the HCWs were working 8 hours (75.5%) and almost half of them were working in medical-surgical wards (46.9), while (44.8%) were working in three shifts.

Regarding years of work experiences, the highest percentage was between groups between 16-20 years of experience (43%) and only (4.4%) for those groups with more than 20 years of experiences.

Although the highest percentage for the number of patients assigned to HCW was among "more than 11 patients" group (47.5%), the lowest were those between 1 to 5 patients assigned groups.

Table No (4.1) Sociodemographic characteristics of the (n=642) study participants (n = 642)

Socio-demographic Variables	No. (n= 642)	(%)
Age (years)		
≤ 29	115	18
30–34	294	45.8
35–39	173	26.9
≥40	60	9.3
Gender		
Male	147	22.9
Female	495	77.1
Socio-demographic Variables	Number	(%)
Marital status		
Single	141	21.9
Married	501	78.1
Specialty		
Physician	103	16.0
Staff Nurse	442	68.8
Pharmacist	64	10.0
Allied health professions	33	5.2
Education level		
Bachelor's degree	541	84.3
Master degree	65	10.1
Ph.D. degree	36	5.6

Number of work hours		
8 Hours	485	75.5
12 Hours	99	15.4
12 Hours +	58	9.1
Schedules		
8 morning hours	143	22.3
Three shifts	288	44.8
Morning/Evening shifts	150	23.4
8 hours in the morning hours with shift	61	9.5
Total years of HCWs experience		
1-5	65	10.1
6-10	86	13.4
11-15	187	29.1
16-20	276	43.0
20 +	28	4.4
Number of patients assigned for HCWs		
1-5	103	16.1
6-10	234	36.4
11 +	305	47.5
Place of work/Department		
ICU	142	22.1
Wards	301	46.9
Emergency room	102	15.9
Operation room	9	1.4
Other (laboratory, x-ray departments and administration)	88	13.7

4.4 Work-related stress analysis

According to the objectives explained above, the work-related stress analysis in the present study was performed for occupational groups of nurses, physicians, pharmacists, and allied health professionals using the HSE tool. It consisted of 35 questions on working conditions (divided into seven primary stressors identified in the management standards approach to tackling work related stress) with five possible responses on each Likert scale; 1=never, 2=rarely, 3=sometimes, 4=often, and 5=always, for each dimension, mean scores compared to the mean score drawn from the HSE standardized data set.

According to the coding for HSE Likert scales in this study, there is an inverse relationship between the total mean of dimensions and work-

related stress i.e., when the total mean of dimensions increased, the work-related stress level decreased.

Demands, control, managerial support, peer support, relationships, role, change and mean score of total HSE dimensions standardised dataset mean were (3.10), (3.47), (3.46), (3.78), (3.85), (4.18), (3.04) and (3.55) respectively (Houdmont, Kerr, & Randall, 2012).

Table No. (4.2): Descriptive statistics of the work-related stress score and its dimensions among n=442 nurses

Dimensions of work-related stress		Role	Communication	Manager	Colleague	Control	Demand	Changes
Age range	≤ 29	2.59 ±0.42	3.78±0.48	2.64±0.38	3.25±0.00	3.17±0.12	2.20±0.88	3.46± 0.32
	30–34	2.56±0.67	3.34±0.83	2.89±0.97	2.41±0.79	3.32±0.88	1.96±0.69	2.82± 0.98
	35–39	2.71±0.58	3.22±0.56	2.76±0.80	2.61±0.49	3.29±0.58	2.01±0.73	2.80±0.71
	≥40	2.11±0.45	2.57±0.55	2.72±0.74	2.42±0.40	2.41±0.31	1.83±0.56	2.31±1.34
	Total mean score	2.51±0.24	3.21±0.27	2.67±0.42	2.63±.20	3.07±.46	1.97±.29	2.8±.46
Gender	Female	2.56±0.65	3.22±0.73	2.71±0.89	2.49±0.68	3.22±0.86	1.86±0.56	2.78±0.93
	Male	2.76±0.29	4.14±0.51	3.06±0.82	2.74±0.59	3.29±0.38	1.42±0.30	2.70±0.24
	Total mean score	2.66±0.94	3.68±.62	2.88±0.85	2.61±0.63	3.25±0.62	1.14±0.43	2.74±0.58
Marital status	Single	2.62±0.53	3.61±0.44	3.06±0.50	2.84±0.51	3.08±0.70	2.09±0.71	3.27±0.59
	Married	2.56±0.66	3.19±0.78	2.66±0.95	2.43±0.69	3.26±0.87	1.78±0.50	2.65±0.93
	Total mean score	2.59±0.59	3.4±0.26	2.86±0.72	2.75±0.60	3.17±0.78	1.93±0.60	3.16±0.76
Education level	Bachelor's degree	2.61±0.66	3.19±0.77	2.72±0.94	2.45±0.69	3.24±0.88	1.77±0.49	2.76±0.97
	Master's degree	2.26±0.49	3.48±0.45	2.91±0.61	2.78±0.73	3.01±0.70	1.96±0.66	2.88±0.51
	Ph.D. degree	2.63±0.33	3.83±0.52	2.57±0.37	2.45±0.10	3.09±0.34	2.39±0.89	2.66±0.42
	Total mean score	2.5±0.49	3.5±0.58	2.73±0.64	2.56±0.50	3.11±0.64	2.04±0.68	2.73±0.63
Number of work hours	8 Hours	2.61±0.65	3.27±0.76	2.72±0.91	2.48±0.70	3.18±0.86	1.81±0.51	2.77±0.94
	12 Hours	2.62±0.18	3.44±0.59	3.21±0.31	2.51±0.38	3.02±0.57	2.87±0.96	2.78±0.15
	>12 Hours	2.21±0.39	3.07±0.50	3.11±0.55	2.66±0.32	3.91±0.13	1.80±0.58	2.53±0.64
	Total mean score	2.48±0.40	3.26±0.61	3.01±0.59	2.55±0.46	3.37±0.52	2.16±0.68	2.69±0.38
Schedules	8 morning hours	2.81±0.63	3.14±0.89	2.49±0.94	2.37±0.64	3.30±0.87	1.82±0.58	2.52±.92
	Three shifts	2.44±0.64	3.32±0.67	2.92±0.93	2.57±0.75	3.33±0.76	1.69±0.37	2.99±0.86
	Morning/Evening shifts	2.42±0.64	3.35±0.42	3.05±0.53	2.58±0.57	2.67±0.86	2.18±0.69	2.97±0.60
	8 morning hours with shift	2.52±0.36	3.37±0.73	2.56±0.74	2.51±0.46	3.47±0.69	1.92±0.70	2.47±0.73
	Total mean score	2.54±0.56	3.29±0.67	2.75±0.78	2.50±0.60	3.19±0.79	1.90±0.58	2.73±0.77
Total years of HCWs experience	1-5	2.75±0.48	3.45±0.44	2.44±0.78	2.47±0.78	2.71±0.70	2.84±0.71	2.05±0.62
	6-10	2.42±0.54	3.19±0.80	2.44±0.75	2.45±0.76	2.34±0.58	3.53±0.86	1.78±0.47
	11-15	2.35±0.57	3.17±0.88	2.92±0.91	2.93±0.90	2.42±0.64	3.18±0.82	1.74±0.40
	16-20	2.92±0.73	3.36±0.64	2.89±0.95	2.89±0.94	2.61±0.78	3.39±0.83	1.83±0.64
	More than 20	2.52±0.06	3.61±0.00	2.31±0.48	2.31±0.49	2.51±0.01	2.23±0.36	2.15±0.03
	Total mean score	2.59±0.47	3.35±0.55	2.6±0.77	2.61±0.06	2.51±0.55	3.03±0.71	1.91±0.43
Number of patients assigned for HCWs	1-5	2.44±0.73	3.42±0.62	2.95±0.70	2.71±0.67	2.83±0.87	2.00±0.58	2.96±0.80
	6-10	2.67±0.52	3.28±0.88	3.03±0.97	2.62±0.69	3.29±0.84	2.02±0.58	3.02±0.93
	11 and more	2.58±0.63	3.19±0.73	2.57±0.89	2.37±0.67	3.35±0.79	1.71±0.49	2.58±0.92
	Total mean score	2.56±0.62	3.29±0.74	2.85±0.85	2.56±0.67	3.15±0.83	1.97±0.55	3.84±0.88
Place of work/Departme	ICU	2.40±0.52	3.44±0.68	2.91±0.76	2.62±0.72	2.98±0.71	2.20±0.53	3.07±0.75
	Wards	2.45±0.57	3.26±0.63	2.61±0.69	2.56±0.56	3.10±0.76	1.77±0.53	2.67±0.80

nt	Emergency room	2.63±0.67	3.36±0.92	3.01±0.49	2.16±0.41	3.43±0.45	1.66±0.42	2.84±0.57
	Operation room	2.52±0.17	2.83±0.51	3.21±0.96	2.27±0.43	2.19±0.26	1.37±0.15	2.66±0.07
	Other units	2.89±0.68	3.20±0.93	2.81±0.23	2.41±0.84	3.57±0.91	1.81±0.59	2.82±0.24
	Total mean score	2.57±0.62	3.21±0.73	2.91±0.62	2.40±0.59	3.05±0.61	1.76±0.44	2.81±0.48

* p value < 0.05

4.4.1 Work-related stress assessments of nurses

The results of work-related stress assessment findings in nurses are shown in Table (4.2).

The mean total score of the dimensions among nurses was (2.40±0.34). According to HSE indicator all nurses in this study had work-related stress. There was a significant difference between the mean score of total dimensions and gender, age, marital status, place of work/department, total years of HCWs experience and number of patients assigned for HCWs.

According to statistical tests within nurses, there was no statistically significant difference between the mean score of total dimensions with education level and number of work hours and schedules of working hours.

There were significant differences between schedules of working hours, total years of HCWs experience and role. Also, the relationship of manager support with number of patients assigned for HCWs, schedules of working hours and total years of HCWs experience were significant. Finally, results showed that there were also significant differences between colleague support and age, gender and marital status.

Significant differences were detected between dimensions of control, colleague support, role and demand with place of work/department. The highest mean scores of work-related stress were significantly found among nurses group, Ph.D. holder degrees' group, 16-20 total years of experience group, worked for more than 12 hours' group, ICU departments group, three shifts group, and assigned to more than 11 patients group (2.40±0.36), (2.80±0.17), (2.95±0.30), (2.81±0.37), (2.75±0.37), (2.83±0.31), (2.92±0.36), respectively.

4.4.2 Work-related stress assessments of physicians

Table (4.3) shows the results of work-related stress assessment findings in COVID- 19 physicians. The mean score of total dimensions among COVID- 19 physicians were 2.77±0.16, although all dimensions of work-related stress were statistically significant, communication and control dimensions mean scores were above the HSE standardized averages.

There were statistically significant differences between the mean score of total dimensions of work-related stress with age, gender, marital status, education level, number of work hours, schedules of working hours,

total years of HCWs experience, and number of patients assigned for HCWs and place of work/department.

Table No (4.3): Mean and standard deviation (SD) of work-related stress score and its dimensions among Physicians (n =103)

Dimensions of work-related stress		Role	Communication	Manager	Colleague	Control	Demand	Changes
Age range	≤ 29	2.88±0.42	3.88±0.48	2.64±0.38	3.25±0.00	3.17±0.12	2.20±0.88	3.46± 0.32
	30–34	2.58±0.67	3.34±0.83	2.89±0.97	2.42±0.79	3.32±0.88	1.95±0.69	2.83± 0.98
	35–39	2.70±0.58	3.22±0.56	2.75±0.80	2.60±0.49	3.29±0.58	2.02±0.73	2.79±0.71
	≥40	2.10±0.45	2.56±0.55	2.69±0.74	2.43±0.40	2.40±0.31	1.83±0.56	2.30±0.34
	Total mean score	2.58±0.52	3.24±0.62	2.67±0.68	2.14±0.48	3.07±0.39	1.97±0.65	2.8±0.62
Gender	Female	2.57±0.65	3.21±0.73	2.72±0.89	2.48±0.68	3.21±0.86	1.85±0.56	2.77±0.93
	Male	2.75±0.29	4.15±0.51	3.05±0.82	2.73±0.59	3.28±0.38	1.43±0.30	2.71±0.24
	Total mean score	2.66±0.47	3.68±0.62	2.88±0.85	2.6±0.63	3.24±0.62	1.64±0.43	2.74±0.6
Marital status	Single	2.61±0.53	3.60±0.44	3.05±0.50	2.83±0.51	3.07±0.70	2.08±0.71	3.28±0.59
	Married	2.57±0.66	3.18±0.78	2.67±0.95	2.42±0.69	3.25±0.87	1.77±0.50	2.64±0.93
	Total mean score	2.59±0.59	3.39±0.61	2.86±0.72	2.62±0.60	3.16±0.78	1.92±0.60	2.96±0.76
Education level	Bachelor's degree	2.62±0.66	3.19±0.77	2.73±0.94	2.46±0.69	3.25±0.88	1.78±0.49	2.75±0.97
	Master's degree	2.25±0.49	3.47±0.45	2.90±0.61	2.79±0.73	3.00±0.70	1.95±0.66	2.89±0.51
	Ph.D. degree	2.64±0.33	3.83±0.52	2.57±0.37	2.45±0.10	3.09±0.34	2.39±0.89	2.66±0.42
	Total mean score	2.5±0.49	3.49±0.58	2.73±0.64	2.56±0.5	3.11±0.64	2.04±0.68	2.76±0.63
Number of work hours	8 Hours	2.60±0.65	3.26±0.76	2.71±0.91	2.49±0.70	3.19±0.86	1.80±0.51	2.78±0.94
	12 Hours	2.62±0.18	3.44±0.58	3.20±0.30	2.50±0.37	3.00±0.57	2.86±0.95	2.77±0.16
	>12 Hours	2.22±0.38	3.08±0.49	3.10±0.57	2.67±0.31	3.90±0.12	1.79±0.57	2.52±0.65
	Total mean score	2.48±0.4	3.26±0.61	3.00±0.59	2.55±0.46	3.36±0.51	2.15±0.67	2.69±0.58
Schedules	8 morning hours	2.80±0.62	3.15±0.89	2.48±0.93	2.38±0.65	3.29±0.86	1.81±0.57	2.52±1.01
	Three shifts	2.43±0.63	3.31±0.68	2.91±0.92	2.58±0.76	3.32±0.77	1.69±0.36	2.98±0.87
	Morning/Evening shifts	2.43±0.66	3.34±0.44	3.06±0.52	2.58±0.58	2.68±0.85	2.17±0.69	2.96±0.62
	8 morning hours with shift	2.51±0.37	3.38±0.72	2.57±0.75	2.50±0.45	3.46±0.69	1.91±0.70	2.47±0.72
	Total mean score	2.54±0.57	3.29±0.68	2.75±0.78	2.51±0.61	3.18±0.79	1.89±0.58	2.73±0.8
Total years of HCWs experience	1-5	2.74±0.48	3.46±0.44	2.46±0.78	2.46±0.78	2.70±0.70	2.85±0.71	2.04±0.62
	6-10	2.41±0.54	3.18±0.80	2.45±0.75	2.45±0.75	2.34±0.58	3.52±0.86	1.79±0.47
	11-15	2.34±0.57	3.16±0.88	2.93±0.91	2.93±0.91	2.41±0.64	3.18±0.81	1.73±0.40
	16-20	2.91±0.73	3.35±0.64	2.88±0.95	2.88±0.95	2.60±0.78	3.38±0.83	1.84±0.64
	More than 20	2.53±0.06	3.00±0.00	2.30±0.48	2.30±0.48	2.50±0.00	2.22±0.36	2.15±0.02
	Total mean score	2.58±0.47	3.23±0.54	2.6±0.77	2.6±0.77	3.49±0.54	3.03±0.71	1.91±0.43
Number of patients assigned for HCWs	1-5	2.45±0.74	3.43±0.62	2.94±0.71	2.70±0.67	2.81±0.87	2.01±0.58	2.95±0.80
	6-10	2.68±0.53	3.27±0.88	3.00±0.97	2.61±0.69	3.29±0.83	2.01±0.58	3.01±0.93
	11 and more	2.59±0.62	3.18±0.73	2.56±0.89	2.37±0.66	3.36±0.79	1.72±0.49	2.59±0.92
	Total mean score	2.57±0.63	3.26±0.74	2.83±0.85	2.56±0.67	3.15±0.83	1.91±0.55	2.85±0.88
Place of work/Department	ICU	2.42±0.52	3.45±0.69	2.92±0.76	2.62±0.72	2.98±0.70	2.20±0.53	3.07±0.75
	Wards	2.45±0.56	3.26±0.62	2.62±0.68	2.56±0.56	3.13±0.75	1.79±0.54	2.66±0.80
	Emergency room	2.62±0.67	3.37±0.93	3.00±0.48	2.06±0.42	3.43±0.46	1.64±0.34	2.83±0.57
	Operation room	2.50±0.170	2.83±.500	3.20±.96	2.25±.43	2.08±0.26	1.36±.13	2.66±1.04
	Other units	2.88±0.66	3.20±0.94	2.80±0.24	2.40±0.85	3.57±0.90	1.80±0.57	2.82±1.15
Place of work/Department	Total mean score	2.57±0.51	3.22±0.73	2.9±0.62	2.33±0.59	3.03±0.61	1.75±0.42	2.8±0.86

* = p value < 0.05

4.4.3 Work-related stress assessments of Pharmacists

Table (4.4) shows the results of the work-related stress assessment findings among pharmacist**.** The total mean score of dimensions among COVID- 19 pharmacists were 2.94±0.38 and statistically significant when compared with standardized (3.55). According to statistical tests in pharmacist, there was no statistically significant difference between the mean score of total dimensions with education level, number of work hours and schedules of working hours.

There were significant differences between total years of HCWs experience and role, managerial support. Also, the relationship of manager and colleagues support with number of patients assigned for HCWs, Schedules of working hours and total years of HCWs experience were significant. Finally, results showed that there was no statistically significant difference between colleague support and gender, education level and number of work hours.

Table No (4.4): Mean and standard deviation (SD) of work-related stress score and its dimensions among Pharmacists (n =64)

Dimensions of work-related stress		Role	Communication	Manager	Colleague	Control	Demand	Changes
Age range	≤ 29	2.68±0.43	3.85±0.49	2.6±0.39	3.25±0.02	3.16±0.13	2.2±0.89	3.46± 0.3
	30–34	2.59±0.65	3.35±0.83	2.9±0.96	2.42±0.8	3.32±0.88	1.95±0.69	2.83± 0.99
	35–39	2.72±0.59	3.23±0.56	2.7±0.81	2.61±0.5	3.3±0.59	2.2±0.7	2.79±0.7
	≥40	2.11±0.46	2.56±0.56	2.70±0.75	2.43±0.41	2.40±0.31	1.82±0.57	2.30±0.3
	Total mean score	2.5±0.52	3.25±0.62	2.66±0.74	2.63±0.23	3.07±0.59	2.01±0.53	2.8±0.38
Gender	Female	2.5±0.64	3.23±0.75	2.7±0.89	2.48±0.69	3.22±0.86	1.85±0.57	2.77±0.94
	Male	2.76±0.3	4.15±0.52	3.1±0.82	2.73±0.6	3.28±0.39	1.43±0.31	2.71±0.25
	Total mean score	2.53±0.33	3.73±0.63	2.9±0.85	2.60±0.37	3.25±0.62	1.64±0.44	2.74±0.59
Marital status	Single	2.61±0.53	3.60±0.44	3.05±0.50	2.83±0.51	3.07±0.70	2.08±0.71	3.28±0.59
	Married	2.57±0.66	3.18±0.78	2.67±0.95	2.42±0.69	3.25±0.87	1.77±0.50	2.64±0.93
	Total mean score	2.59±0.59	3.39±0.61	2.86±0.5	2.62±0.6	3.16±0.47	1.92±0.6	2.96±0.76
Education level	Bachelor's degree	2.6±0.66	3.19±0.77	2.74±0.94	2.47±0.69	3.26±0.89	1.76±0.5	2.75±0.9
	Master's degree	2.3±0.47	3.45±0.43	2.9±0.63	2.7±0.73	3.01±0.7	1.94±0.60	2.9±0.52
	Ph.D. degree	2.6±0.34	3.83±0.56	2.57±0.37	2.46±0.1	3.1±0.35	2.39±0.86	2.65±0.43
	Total mean score	2.5±0.49	3.49±0.58	2.73±0.64	2.54±0.47	3.12±0.43	2.03±0.5	2.76±0.34
Number of work hours	8 Hours	2.64±0.65	3.25±0.74	2.71±0.91	2.49±0.70	3.19±0.82	1.80±0.50	2.76±0.93
	12 Hours	2.63±0.19	3.46±0.55	3.27±0.31	2.52±0.38	3.02±0.55	2.86±0.91	2.77±0.17
	>12 Hours	2.21±0.39	3.18±0.47	3.12±0.58	2.66±0.32	3.9±0.14	1.76±0.52	2.53±0.65
	Total mean score	2.49±0.41	3.29±0.58	3.03±0.6	2.55±0.46	3.37±0.5	2.14±0.64	2.68±0.358
Schedules	8 morning hours	2.80±0.62	3.15±0.89	2.38±0.94	2.38±0.65	3.29±0.86	1.82±0.57	2.52±1.01
	Three shifts	2.42±0.63	3.32±0.69	2.94±0.92	2.56±0.74	3.31±0.74	1.69±0.36	2.99±0.86
	Morning/Evening shifts	2.44±0.67	3.35±0.4	3.16±0.53	2.6±0.57	2.69±0.84	2.2±0.7	2.95±0.63
	8 morning hours with shift	2.52±0.36	3.39±0.73	2.56±0.76	2.5±0.44	3.47±0.68	1.91±0.71	2.48±0.7
	Total mean score	2.54±0.57	3.3±0.58	2.76±0.78	2.51±0.6	3.19±0.78	1.9±0.42	2.73±0.64
Total years of HCWs	1-5	2.75±0.48	3.47±0.4	2.44±0.78	2.47±0.77	2.70±0.71	2.85±0.72	2.02±0.63
	6-10	2.43±0.54	3.19±0.81	2.45±0.76	2.45±0.75	2.34±0.58	3.5±0.86	1.77±0.46

experience	11-15	2.32±0.56	3.2±0.85	2.93±0.92	2.90±0.92	2.41±0.64	3.1±0.81	1.7±0.42
	16-20	2.91±0.70	3.33±0.64	2.85±0.95	2.89±0.95	2.62±0.79	3.38±0.83	1.82±0.6
	More than 20	2.54±0.06	3.03±0.02	2.3±0.44	2.31±0.49	2.51±0.01	2.23±0.35	2.16±0.04
	Total mean score	2.59±0.37	3.24±0.47	2.59±0.77	2.60±0.77	2.51±0.54	3.01±0.71	1.89±0.32
Number of patients assigned for HCWs	1-5	2.35±0.72	3.43±0.6	2.94±0.73	2.74±0.67	2.8±0.88	2.01±0.57	2.96±0.82
	6-10	2.66±0.54	3.26±0.89	3.03±0.97	2.62±0.7	3.3±0.82	2.02±0.56	3.2±0.92
	11 and more	2.49±0.63	3.19±0.7	2.56±0.9	2.37±0.65	3.35±0.8	1.73±0.44	2.59±0.93
	Total mean score	2.5±0.63	3.29±0.34	2.84±0.59	2.57±0.46	3.15±0.59	1.92±0.52	2.91±0.89
Place of work/Department	ICU	2.41±0.53	3.43±0.68	2.9±0.75	2.61±0.73	2.97±0.72	2.22±0.52	3.08±0.74
	Wards	2.46±0.54	3.25±0.63	2.61±0.67	2.58±0.57	3.12±0.74	1.8±0.53	2.67±0.81
	Emergency room	2.63±0.66	3.36±0.94	3.1±0.47	2.07±0.43	3.42±0.45	1.60±0.33	2.82±0.51
	Operation room	2.51±1.19	2.84±0.52	3.21±0.96	2.23±0.43	2.07±1.25	1.33±0.13	2.67±1.02
	Other units	2.89±0.7	3.22±0.95	2.82±1.23	2.44±0.86	3.58±0.92	1.82±0.58	2.80±1.14
	Total mean score	2.58±0.59	3.22±0.74	2.92±0.81	2.38±0.6	3.03±0.81	1.75±0.41	2.8±0.84

Table No (4.5): Mean and standard deviation (SD) of work-related stress score and its dimensions among Allied Health Professions (n =33)

Dimensions of work-related stress		Role	Communication	Manager	Colleague	Control	Demand	Changes
Age range	≤ 29	2.9±0.49	3.85±0.47	2.6±0.39	3.26±0.03	3.18±0.12	2.23±0.88	3.46± 0.33
	30–34	2.61±0.66	3.33±0.82	2.99±0.98	2.4±0.8	3.3±0.8	1.94±0.69	2.84± 0.98
	35–39	2.71±0.55	3.21±0.55	2.76±0.81	2.60±0.5	3.3±0.59	2.03±0.74	2.79±0.73
	≥40	2.11±0.43	2.57±0.55	2.7±0.73	2.43±0.41	2.42±0.32	1.84±0.57	2.3±1.35
	Total mean score	2.54±0.43	3.24±0.61	2.69±0.74	2.62±0.23	3.07±0.44	1.98±0.65	2.79±0.69
Gender	Female	2.67±0.72	3.22±0.75	2.73±0.9	2.5±0.71	3.23±0.85	1.87±0.57	2.78±0.94
	Male	2.77±0.28	3.75±0.51	3.15±0.82	2.72±0.59	3.26±0.37	1.44±0.34	2.72±0.23
	Total mean score	2.72±0.5	3.48±0.63	2.94±0.45	2.61±0.65	3.24±0.61	1.65±0.45	2.75±0.58
Marital status	Single	2.71±0.52	3.67±0.48	3.15±0.52	2.83±0.51	3.17±0.70	2.18±0.71	3.29±0.59
	Married	2.54±0.67	3.19±0.79	2.67±0.94	2.44±0.69	3.26±0.87	1.77±0.53	2.64±0.95
	Total mean score	2.62±0.59	3.43±0.63	2.91±0.73	2.63±0.6	3.21±0.78	1.97±0.62	2.96±0.77
Education level	Bachelor's degree	2.5±0.60	3.29±0.77	2.75±0.95	2.48±0.69	3.3±0.89	1.76±0.45	2.77±0.97
	Master's degree	2.3±0.48	3.57±0.45	2.92±0.62	2.89±0.73	3.04±0.70	1.98±0.66	2.91±0.52
	Ph.D. degree	2.7±0.33	3.80±0.52	2.54±0.35	2.46±0.12	3.19±0.4	2.4±0.9	2.69±0.44
	Total mean score	2.53±0.47	3.55±0.58	2.73±0.64	2.61±0.31	3.17±0.54	2.04±0.4	2.79±0.64
Number of work hours	8 Hours	2.54±0.65	3.29±0.76	2.79±0.91	2.5±0.70	3.23±0.86	1.85±0.51	2.8±0.94
	12 Hours	2.60±0.18	3.45±0.58	3.23±0.30	2.53±0.37	3.11±0.57	2.84±0.95	2.75±0.16
	>12 Hours	2.21±0.38	3.13±0.49	3.18±0.57	2.66±0.31	3.92±0.17	1.8±0.57	2.4±0.65
	Total mean score	2.45±0.4	3.29±0.61	3.06±0.59	2.56±0.46	3.42±0.53	2.16±0.67	2.65±0.58
Schedules	8 morning hours	2.82±0.63	3.15±0.89	2.48±0.93	2.38±0.65	3.29±0.86	1.81±0.57	2.52±1.01
	Three shifts	2.42±0.63	3.32±0.69	2.99±0.93	2.58±0.77	3.39±0.77	1.7±0.36	2.99±0.88
	Morning/Evening shifts	2.41±0.66	3.33±0.43	3.16±0.52	2.58±0.57	2.70±0.84	2.16±0.69	2.95±0.63
	8 morning hours with shift	2.61±0.37	3.4±0.73	2.59±0.74	2.50±0.42	3.5±0.69	1.98±0.71	2.5±0.71
	Total mean score	2.56±0.76	3.3±0.68	2.8±0.78	2.51±0.6	3.22±0.79	1.91±0.58	2.74±0.8
Total years of HCWs experience	1-5	2.73±0.48	3.5±0.42	2.49±0.78	2.47±0.79	2.79±0.71	2.90±0.71	2.1±0.62
	6-10	2.44±0.54	3.18±0.81	2.46±0.75	2.46±0.76	2.34±0.57	3.59±0.86	1.77±0.47
	11-15	2.33±0.57	3.17±0.89	2.99±0.90	2.98±0.92	2.46±0.63	3.13±0.81	1.71±0.42
	16-20	2.99±0.73	3.4±0.64	2.87±0.96	2.87±0.94	2.65±0.76	3.42±0.83	1.82±0.63
	More than 20	2.55±0.06	3.01±0.01	2.35±0.44	2.31±0.47	2.58±0.05	2.19±0.35	2.2±0.01
	Total mean score	2.6±0.47	3.25±0.55	2.65±0.76	2.61±0.77	2.56±0.54	3.04±0.71	1.92±0.43
Number of patients assigned for	1-5	2.44±0.74	3.49±0.62	2.99±0.76	2.85±0.67	2.89±0.87	2.61±0.58	2.99±0.80
	6-10	2.71±0.53	3.3±0.88	3.05±0.97	2.67±0.69	3.34±0.84	2.41±0.58	3.08±0.93
	11 and more	2.6±0.62	3.22±0.73	2.59±0.9	2.40±0.66	3.32±0.79	1.79±0.49	2.69±0.92

HCWs	Total mean score	2.58±0.63	3.33±0.74	2.87±0.6	2.64±0.67	3.18±0.58	2.27±0.55	2.92±0.88
Place of work/Department	ICU	2.42±0.52	3.45±0.69	2.92±0.76	2.63±0.72	2.97±0.71	2.23±0.54	3.07±0.75
	Wards	2.49±0.56	3.26±0.62	2.62±0.68	2.56±0.56	3.23±0.76	1.89±0.52	2.66±0.80
	Emergency room	2.64±0.67	3.4±0.93	3.1±0.48	2.15±0.41	3.53±0.46	1.67±0.34	2.84±0.56
	Operation room	2.53±1.170	2.95±.51	3.27±.96	2.30±.43	2.18±1.24	1.35±.13	2.64±1.03
	Other units	2.91±0.66	3.27±0.84	2.82±1.27	2.52±0.85	3.61±0.90	1.85±0.57	2.80±1.15
	Total mean score	2.59±0.71	3.26±0.71	2.94±0.83	2.43±0.59	3.10±0.81	1.59±0.42	2.8±0.85

* = p value < 0.05

4.4.4 Work-related stress assessments of Other Allied Health Professions

Table (4.5) shows the results of the work-related stress assessment findings among allied health professions

The total mean score of dimensions among other allied health professions were (2.92±0.36) which statistically significant. According to statistical tests, all allied health professions in this study had work-related stress i.e. that mean scores of HSE dimensions were less than standardized average, however, there were significant differences between demand, communication dimensions and total years of HCWs experience, number of patients assigned for HCWs, schedules of working hours and, total years of HCWs experience.

4.5 Comparison of Work-related stress assessments among Study Groups

Table (4.6)presents the final stress scores in the occupational groups participating in this study that obtained from the HSE tool indicator, the level of work-related stress increased due to obtaining lower scores in most dimensions.

The mean score of total dimensions in all study groups were 2.70±0.37, which indicated that there was work-related stress among study groups who worked with COVID-19. The level of stress in nurses group was higher than all other groups under study (2.40±0.34). There was no a statistically significant difference in role dimension for all study groups.

Table No (4.6): Total scores of health and safety executive (HSE) tool indicator dimensions among study groups.

	Role	Communication	Manager	Colleague	Control	Demand	Changes	Mean score of total dimensions
nurses	2.56±0.66	3.94±0.49	2.82±0.89	2.82±0.89	3.22±0.84	1.78±0.49	2.80±0.91	2.40±0.34
Physicians	2.67±0.31	3.94±0.49	2.33±0.38	2.33±0.38	3.28±0.33	2.13±0.75	2.51±0.29	2.77±0.16
pharmacists	2.75±0.46	3.81±0.89	2.94±0.88	2.94±0.88	2.76±0.43	2.32±0.89	3.01±0.73	2.94±0.38
allied professions health	2.57±0.63	2.56±0.66	2.16±0.86	2.16±0.86	3.51±0.11	1.74±0.35	2.36±1.12	2.96±0.36
Total	2.581±0.64	3.261±0.74	2.744±0.89	2.5±0.68	3.221±0.85	1.835±0.56	2.768±0.91	2.70±0.37
P. Value	0.591[2]	0.000*[2]	0.000*[2]	0.000*[2]	0.009*[2]	0.000*[2]	0.026*[2]	0.001*[2]
HSE standardized	3.10	3.47	3.46	3.78	3.85	4.18	3.04	3.55

*p-value <0.05

Although, all HCWs with different age groups have the lowest stress score in the role dimension; HCWs who are aged below 29 years old have the highest stress score in the control dimension (3.88±0.48), those groups of HCWs between ≤ 29 years and 35-39 years have the highest stress score in the relationship dimension (3.17±1.06, 3.29±0.58) respectively, HCWs aged above 40 years old group have the highest stress score in manager support dimension (2.69±0.74). Significant stress levels are observed in all dimensions among all HCWs in different age groups.

HCWs (female and male) have significantly the lowest stress score in the role dimension, p =0.0001. While the highest stress score among female HCWs was not statistically significant (3.21±0.86) in the relationship dimension, the highest stress score among male HCWs was significantly (4.15±0.51) in the control dimension.

Single HCWs have a significantly higher mean score in the control dimension (3.60±0.44) than in the married group (3.25±0.87) of the relationship dimension, which was not statistically significant.

HCWs with master's and Ph.D. degrees have significant the highest stress score in the control dimension, (3.47±0.45) and (3.83±0.52) respectively, while bachelor's degree holders have the highest stress score in the relationship dimension (3.25±0.88).

Physicians, nurses, and pharmacists have significant the highest stress score in the control dimension, (3.28±0.33), (3.22±0.84), and (2.76±0.43) respectively, also allied health professions have significantly the highest stress score in the relationship dimension.

Working for 8 and 12 hours has the highest stress score in the control dimension (3.26±0.76) and (3.44±0.58) respectively while working for more

than 12 hours has the highest significant stress score in the relationship dimension (3.90±0.12)**.**

As regards schedule of working hours, first shift (8 morning hours) have the highest stress score in the relationship dimension (3.29±0.86), while morning/evening shifts have the highest stress score in control dimension (3.34±0.44).

As regards experience, those group between 6-10 years of experiences have significantly the highest stress score in the role dimension (3.52±0.86), p 0.0001, while less than 5 years of HCWs experiences have the highest stress score in the control dimension (3.46±0.44). All HCWs with different years of experience have significantly the lowest stress score in the change dimension.

HCWs who were assigned to more than 11patients for each one have significantly the highest stress score in the relationship dimension (3.36±0.79) respectively, p=0.0001, but 1-5 patients assigned for each HCWs have the highest stress score in control dimension (3.43±0.62).

Place of work/Department as ICU have the highest stress score in the control dimension (3.45±0.69), while the emergency room have significantly the highest stress score in the relationship dimension (3.43±0.46), but operation room has the highest stress score in manager support dimension (3.20±0.96).

HCWs who work at morning /evening shift have a significant high-stress level in the relationship dimension (2.68±0.85) compared with 8 morning hours (1.81±0.57), three shifts (1.69±0.36), and 8 morning hours with shift (1.91±0.70).

Additionally, stress levels increased significantly when HCWs worked for more than 16 years of experience as increased the demand, workload, and work environment (2.91±0.73).

Managerial and peer support are considered important dimensions that decrease work-related stress levels and were significantly observed with different HCWs' characteristics such as age, marital status, Specialty, and place of work/department.

When the number of patients assigned increased for more than 5 patients, stress levels increased significantly (3.36±0.79) and affect the quality of relationships and promote positive work to prevent conflicts and address unacceptable behaviors.

There were significant differences between the mean score of work-related stress of total dimensions and total years of health care workers (HCWS) experience, age, gender, marital status, Specialty, place of work/department and number of patients assigned for HCWs.

All HCWs' characteristics (n =642), schedules of working hours, specialty, number of patients assigned for HCWs' and place of work/department have a significant low-stress level in the role dimension that verify the HCWs' awareness about their position in the organization.
This indicates that overall Jordanian HCWs in quarantine isolation RMS hospitals who deal and care for patients with COVID-19 have observed work-related stress.

4.6 First research question: **Does the level of work related stress mean scores in quarantine isolation hospitals differ among Jordanian health professions?**

The descriptive statistic indices (frequency, percentage, mean and standard deviation) were used to analyze the data of (n=642) HCWs exposed to COVID-19 patients working in RMS hospitals in COVID-19 related wards such as emergency, ICUs, internal medicine and surgical wards.

The range level of work-related stress among HCWs in this study is high compared to the HSE standardized dataset and the mean score of total dimensions were (2.702±0.37**),** however, the mean total score of the work-related stress among nurses (2.40±0.36) were higher than (2.94±0.38) Pharmacist, (2.77±0.16) Physician, and (2.91±0.34) allied health professions, as emphasized previously the inverse relation between total work-related stress dimensions and the level of work-related stress.

The HCW's characteristics and work-related factors significantly affected the mean work-related stress score for total dimensions; however, the relationship was not statistically significant in schedules of working hours, the number of work hours, and education level.

In this study, it revealed a significant difference observed among participants regarding work related stress. Also, it found that caring for critical and emergency cases patients who are infected with COVID-19 increases HCW's stress levels. Work related stress levels of female participants were statistically significantly higher than male participants in all different health professions**.**

Additionally, HCWs that worked three shifts, Morning/Evening shifts, and more working hours had higher work-related stress than participants with fixed morning shifts and 8 morning hours with shift work.

Participants who caring for COVID-19 patients, married, have family members and children had higher work related stress more than other HCWs.

Both nurses and physician have a significant high and equal stress level at the control dimension which evaluates the autonomy of the workers

(3.94±0.49), p=0.0001 and a significant low-stress level at the role dimension that verify the HCWs' awareness about their position in the organization (2.13±0.75, 1.78±0.49) respectively.

Mean scores for overall HSE were (2.702± 0.37); (2.581±0.64) demand, (3.261±0.74) control, (3.221±0.85) relationships, (2.768±0.91) change, (2.5±0.68) peer support, (2.744±0.89) managerial support and role (1.835±0.56) was significantly below HSE standardized means, this indicated of high an overall HSE mean score and required immediate corrective actions.

The statistical test of difference among groups showed statistically significant differences in work-related stress among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F (2, 94) =3.028, p=.0001). Duncan post hoc criterion for multiple group comparison revealed statistically significant differences among the groups. Nurses group reported work-related stress level more than the physicians (p =.021), physicians group reported work-related stress level more than the other health allied professions, and the other health allied professions group reported work-related stress level more than pharmacists group (p =.003). This means that nurses reported the highest perceived mean.

The statistical test of difference among groups also showed statistically significant differences in communication work-related stress dimensions among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F(2,94)= 3.787, p = 0.0001). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Nurses and physicians' groups reported the same mean scores and more than pharmacists group (p = 0.02) and pharmacists group more than health allied professions group (p = 0.05). This means that Nurses and physicians reported the highest mean.

The statistical test of difference among groups also showed statistically significant differences in colleague work-related stress dimensions among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F (2,94)= 3.547, p = 0.001). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Pharmacists group reported mean scores more than nurses group (p = 0.03), nurses group more than physicians group (p = 0.05) and physicians group reported mean scores more than health allied professions (p=0.01).

The statistical test of difference among groups test also showed statistically significant differences in manager work-related stress dimensions among four groups of HCW's (nurses, physicians, other health

allied professions and pharmacists (F (2,94)= 3.097, p =.001). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Pharmacists group reported mean scores more than nurses group (p = 0.02), nurses group more than physicians group (p = 0.03) and physicians group reported mean scores more than health allied professions (p = 0.02), indicating that pharmacists reported the highest mean.

The statistical test of difference among groups test also showed statistically significant differences in control work-related stress dimensions among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F (2,94)= 3.267, p =.009). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Health allied professions group reported mean scores more than physicians group (p=0.02), physicians group more than nurses group (p= 0.03) and nurses group reported mean scores more than pharmacists group (p = 0.05). This means that health allied professions reported the highest mean.

The statistical test of difference among groups test also showed statistically significant differences in demand work-related stress dimensions among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F (2,94)= 3.19, p = 0.02). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Pharmacists group reported mean scores more than physicians group (p = 0.05), physicians group more than nurses group (p= 0.04) and nurses group reported mean scores more than other health allied professions group (p =.01). This means that pharmacists reported the highest mean.

The statistical test of difference among groups test also showed statistically significant differences in changes' work-related stress dimensions among four groups of HCW's (nurses, physicians, other health allied professions and pharmacists (F (2,94)= 3.01, p = 0.02). Duncan post hoc criterion for multiple group comparison revealed a statistically significant difference among previous groups. Pharmacists group reported mean scores more than nurses group (p=0.03), nurses group more than physicians group (p=0.01) and physicians group reported mean scores more than other health allied professions group (p = 0.01). This means that pharmacists reported the highest mean.

The role dimension did not differ significantly according to age, educations of level and place of work among nurses and other allied health profession, p=0.591.

4.7 Second Research question: what are the factors that may contribute to stress among Jordanian HCWs (physicians, nurses, pharmacists and allied health professions) working in quarantine areas for COVID-19 patients in RMS hospitals?

4.7.1 Factors that affect work related stress

Different variables played an important role and are considered as risk factors for work-related stress and significantly had linear relationship and connected with work related stress such as total years of HCWs experience, age, gender, marital status, specialty, place of work/department, and the number of patients assigned for HCWs.

These are the following variables with their reference categories that entered for each HCW's groups: age (≤ 29), gender (female), educational level (Ph.D. degree), marital status (married), specialty (coded into four levels; physician, pharmacist, nurses, and allied HCW), total years of HCWs experience (16-20), the number of working hours (> 12 hours), Schedules (Three shifts),the number of patients assigned for HCWs (11 and more), place of work/department (ICU).

The results displayed in Table (4.7) reveals Model summary of stepwise multiple linear regression for work-related stress score

Model 1 was the initial model for nurses group, model 2 was the second model for physicians group, model 3 was the third model for pharmacists group, and finally model 4 was the fourth model for allied health professions group.

Model 1, 2, 3 and 4 were entered into stepwise multiple linear regression to determine the order of significant predictors (independent variables) that might affect the work-related stress score (dependent continuous variable) among HCWs that might affect work-related stress score. The variables with more than two categories (dichotomous variables) were transformed into dummy variables, the predictors that entered into the stepwise model are tested for p value is smaller than 0.05, $\beta k=0$ and therefore proceed to the second step.

The iteration of stepwise multiple linear regression for analyzing the data depends on the forward-backward selection with criteria of probably F value to enter <0.05 and to remove >0.10 (default). All variables were significant and left in the final model (Age, Gender, Marital Status, education level, Number of work hours, schedules of working hours, Total years of HCWs experience, Number of patients assigned for HCWs, and place of work/Department), p value <0.05.

The results showed that the adjusted R^2 in model 1 was 6.3% of the variance in work-related stress score. Then, by adding the model 2, the adjusted R^2 reached 8.8%, next by adding the model 3, the adjusted R^2 reached 9.7%, finally by adding the model 4, the adjusted R^2 reached 10.8% and in each iteration method, the R^2 change is significant at p value < 0.05.

Table No (4.7): Model of stepwise multiple linear regression for work-related stress score

Model	R	Adjusted R^2	F-ratio	p-value
1	0.252	0.063	82.319	<0.01*
2	0.298	0.088	59.187	<0.02*
3	0.302	0.091	60.20	<0.01*
4	0.312	0.096	62.176	<0.03*

*p value<0.05

The results displayed in Table (4.8) reveals the order of significant predictors among nurses.

Nurses who are male and worked more than 16 years of experience were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =1.159, B =0.712) units on average than those who are single and those who have master degrees or lower.

Moreover, nurses who aged below 29 years, had Ph.D. degree, and who work in the ICU department were negatively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B = -1.747, B=-1.059, B= -0.804), p value <0.05.

Nurses who are married, worked on three shifts and had 11 and more of patients assigned were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =1.480, B=0.701, B =1.707) average.

Table (4.8): Model of significant predictors for work-related stress scores among nurses (n=442).

Predictors	B	SE	Beta	T value	Sig
X1: Age (≤ 29 years)	-1.747	0.232	0.222	7.541	0.001*
X2: gender (male)	1.159	0.221	0.130	4.799	0.001*
X3: Marital Status (married)	1.480	0.310	0.135	4.767	0.001*
X4: Education level (PhD degree)	-1.059	0.923	0.113	4.240	0.001*
X5: Number of work hours (more than 12 hours)	1.846	0.595	0.085	3.101	0.002*
X6: Schedules (three shifts)	0.701	0.240	0.088	2.919	0.004*
X7: Total years of HCWs experience (16-20 years)	0.712	0.254	0.124	2.825	0.003*
X8: Number of patients assigned for HCWs (11 and more)	1.707	0.321	0.184	2.817	0.002*
X9: Place of work/Department(ICU)	-0.804	0.224	0.104	2.945	0.003*

Equation Work-related stress score = $-1.747x_1 + 1.159x_2 + 1.480x_3 - 1.059x_4 + 1.846x_5 + 0.701x_6 + 0.712_{x7} + 1.707x_8 - 0.804x_9$

*p-value <0.05

The results displayed in Table (4.9) reveals the order of significant predictors among physicians.

Physicians who are males and worked more than 16 years of experience were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B = 1.254, B =1.212) units on average.

Physicians who have master degrees or lower, work for more than 12 hours and who work in the ICU department had a positive association with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B=2.015, B=0.946, B=1.704) units on average, p value <0.05.

Physicians who aged 29 years and below, married, worked on three shifts and assigned for 11 and more patients had a positive association with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B=1.747, B=1.583, B=0.921, B=2.727) units on average, p value <0.05.

Table (4.9): Model of significant predictors for work-related stress scores among physicians (n=103)

Predictors	B	SE	Beta	T value	Sig
X1: Age (≤ 29 years)	**-2.047**	**0.302**	**0.204**	**5.341**	**0.001***
X2: gender (male)	**1.298**	**0.181**	**0.233**	**2.95**	**0.002***
X3: Marital Status (married)	**1.603**	**0.239**	**0.205**	**1.76**	**0.002***
X4: Education level (PhD degree)	**1.145**	**0.921**	**0.103**	**6.225**	**0.003***
X5: Number of work hours (more than 12 hours)	**2.245**	**0.557**	**0.185**	**1.120**	**0.001***
X6: Schedules (three shifts)	**1.921**	**0.244**	**0.288**	**3.991**	**0.001***
X7: Total years of HCWs experience (16-20 years)	**1.232**	**0.314**	**0.304**	**2.824**	**0.002***
X8: Number of patients assigned for HCWs (11 and more)	**-1.027**	**0.279**	**0.284**	**1.894**	**0.001***
X9: Place of work/Department(ICU)	**2.114**	**0.224**	**0.134**	**2.932**	**0.001***

Equation Work-related stress score = $-2.047x_1 + 1.298x_2 + 1.603x_3 + 1.145x_4 + 2.245x_5 + 1.921x_6 + 1.232_{x7} - 1.027x_8 + 2.114x_9$

*p-value <0.05

The results displayed in Table (4.10) reveals the order of significant predictors among pharmacists.

pharmacists who are male aged more than 29 years and had less than 11 patients assigned were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =1.298, B = 2.047, B =1.027) average.

Pharmacists who are married and had PhD degree were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =1.603, B = 1.145) average.

Pharmacists who are worked more than 12 hours on three shifts, had 16-20 years experiences on ICU were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =2.245, B=1.921, B=1.232, B=2.114) average.

Table (4.10): Model of significant predictors for work-related stress scores among pharmacists (n=64)

Predictors	B	SE	Beta	T value	Sig
X1: Age (≤ 29 years)	**-1.747**	**0.232**	**0.222**	**7.541**	**0.001***
X2: gender (male)	**1.159**	**0.221**	**0.130**	**4.799**	**0.001***
X3: Marital Status (married)	**1.480**	**0.310**	**0.135**	**4.767**	**0.001***
X4: Education level (PhD degree)	**-1.059**	**0.923**	**0.113**	**4.240**	**0.001***
X5: Number of work hours (more than 12 hours)	**1.846**	**0.595**	**0.085**	**3.101**	**0.002***
X6: Schedules (three shifts)	**0.701**	**0.240**	**0.088**	**2.919**	**0.004***
X7: Total years of HCWs experience (16-20 years)	**0.712**	**0.254**	**0.124**	**2.825**	**0.003***
X8: Number of patients assigned for HCWs (11 and more)	**1.707**	**0.321**	**0.184**	**2.817**	**0.002***
X9: Place of work/Department(ICU)	**-0.804**	**0.224**	**0.104**	**2.945**	**0.003***

Equation Work-related stress score = $-1.747x_1 + 1.159x_2 + 1.480x_3 - 1.059x_4 + 1.846x_5 + 0.701x_6 + 0.712_{x7} + 1.707x_8 - 0.804x_9$

* $p<0.05$

Table (4.11) shows the order of significant predictors among allied health professions. Allied health professions as similar as nurses had several predictors, these predictors were negatively associated with increased work-related stress scores.

Allied health professions whose aged 29 and below, had Ph.D. degree, and who work in the ICU department were negatively associated with work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B = -2.327, B=-1.205, B = -1.194).

Allied health professions who are male, married and worked more than 16 years of experience were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =1.321, B =1.751, B =1.257) units on average.

Allied health professions who are worked more than 12 hours, on three shifts and had 11 and more patients assigned were positively associated with increased work-related stress scores, demonstrating the predictive power of significant predictors to predict work-related stress score by (B =2.305, B =2. 141, B =2.014) units on average.

Table No (4.11): Model of significant predictors for work-related stress scores among allied health professions (n=33).

Predictors	B	SE	Beta	T value	Sig
X1: (Age ≤ 29 years)	**-2.327**	**0.321**	**0.201**	**2.221**	**0.001***
X2: gender (male)	**1.321**	**0.241**	**0.213**	**1.950**	**0.001***
X3: Marital Status (married)	**1.751**	**0.179**	**0.285**	**1.56**	**0.001***
X4: Education level (PhD degree)	**-1.205**	**0.541**	**0.153**	**4.205**	**0.000***
X5: Number of work hours (more than 12 hours)	**2.305**	**0.017**	**0.215**	**2.100**	**0.001***
X6: Schedules (three shifts)	**2. 141**	**0.218**	**0.284**	**2.951**	**0.001***
X7: Total years of HCWs experience (16-20 years)	**1.257**	**0.297**	**0.204**	**1.084**	**0.001***
X8: Number of patients assigned for HCWs (11 and more)	**2.014**	**0.278**	**0.204**	**2.804**	**0.001***
X9: Place of work/Department (ICU)	**-1.194**	**0.204**	**0.132**	**1.920**	**0.000***
Equation Work-related stress score = -2.327x1 + 1.321x2 + 1.751x3-1.205x4+2.305x5 +2. 141x6+ 1.257x7+ 2.014x8-1.194x9					

* $p<0.05$

4.8 Discussion

This study aimed to determine the level of work related stress among Jordanian HCWs in quarantine isolation hospitals who deal and care for patients with COVID-19, in addition, to investigate the factors that may impact stress among Jordanian HCWs working at quarantine areas for COVID-19 patients in RMS hospitals. The results of the current study were discussed to highlight the extent of their compatibility and differences with previous literature and suggest some recommendations in light of these results.

The study was performed on 642HCWs exposed to COVID-19 patients working at COVID-19 related treatment centers namely, Queen Alia Military quarantine hospital, First Military field hospital in Zarqa, and Military field hospital in Irbid. Participants in this study worked in COVID-19 related wards, including the emergency, intensive care unit (ICU), medical-surgical wards, operation rooms, and others. The HCWs included were 442 nurses, 64 pharmacists, 103 physicians, and 33 allied health professionals. Healthcare workers (HCWs) included in this study worked on three shifts as each shift lasts 8 hours in the morning, or in the evening whereas, the night lasts for 12 hours.

4.8.1 Work-Related Stress among HCWs

According to the results, the mean total scores of all dimensions were (2.70 ±0.37), which indicated the high level of work related stress level among HCWs at RMS quarantine hospitals. Also, the results of the current study are consistent with the results of a study conducted in Iran by Zare et al., (2021) among HCWs dealing with COVID-19 patients using the HSE scale, this study assessed the status of work-related stress in the three occupational groups of nurses, physicians and hospital cleaning crew at the frontline of fighting COVID-19.The results showed high-stress scores among HCWs during COVID-19, the mean score of total dimensions among HCWs was 2.93, which also below the standard dataset HSE (Houdmont, Kerr & Randall, 2012).

However, the mean total score of the work-related stress dimensions among nurses was (2.40±0.36), pharmacists (2.94±0.38), physicians (2.77±0.16), and (2.91±0.34) allied health professions. The results of current study are consistent with Zare et al., (2021) which showed that the mean total score of the dimensions detected among nurses during theCOVID-19 pandemic, the range between moderate to high-stress levels (2.31) which used the same scale; HSE questionnaire. In contrast, in the same study the mean score of total dimensions among physicians was (3.53) which indicating that the level of stress among physicians was between low and moderate stress levels (Zare et al., 2021).

While, the findings of a study in the United Arab Emirates which used the a 10-item scale to measure perceived stress levels, showed that 78.1% reported a moderate level of stress among nurses who worked in isolation wards during COVID-19 (Dabou et al., 2022).Whereas a study conducted by Akbari et al., (2017) in Iran showed a moderate range in the mean stress score (3.17) on the HSE questionnaire, it seems that the reason for the effect of stressful situations caused by COVID-19pandemic.The results showed a higher level of work related stress among nurses than other HCWs.

Accordingly, the stress level of physicians was higher compared to pharmacists and allied health professionals. However, this result was consistent with Zare et al., (2021), the outcome indicated that nurses had a higher level of stress compared to the physicians and other HCWs. In a study was performed by Khanam et al., (2020), among the frontline HCWs during COVID-19, used self-reported stress questionnaire and the impact of event scale—revised (IES-R), the results confirmed that the level of stress in the occupational group nurses was higher than physicians (Khanam et al., 2020).

Also, Alhalaiqa et al., (2021) and Al Ammari et al., (2021) support this result; being a nurse exhibited higher rates of stress. Conversely, there were no significant differences observed between professions (nurses, doctors, radiologists, and pharmacists) regarding stress (Alnazly et al., 2021). Also, the results were consistent with the results demonstrated that nursing directly provided care to COVID-19 patients with confirmed or suspected infections was more depressed, anxious, and stressed by the viral epidemic than other healthcare workers during the of the COVID-19 pandemic (Ahn et al., 2021).

The majority of participants were nurses (68.8%). Nurses had more psychological distress than other HCWs as they worked in direct contact with COVID-19 patients (Preti et al., 2020). Most of HCWs dealing with COVID-19 are distressed due to stressful situations such as inadequate work experience in pandemics and inadequate experience and information about the virus itself (Paolocci et al., 2021).

Among the seven dimensions; the demand mean score for all HCWs was (2.581±0.64) indicating high levels of stress; such as workload, characteristics, and work environment. The job demands mean score was below the HSE standard dataset mean (mean = 3.10), the dimension was by the analysis tool in relation to standardized data, which recommends urgent action needed, because of the demand is reflected as an aspect of the job that is difficult for an HCWs to achieve. These aspects can be named as workload, work reaction speed, and work environment situations (Zare et al., 2021).

According to Zare et al., (2021) the mean total score of the dimensions obtained by all work-related was (2.93) which indicated the level of stress between moderate to high levels among HCWs. In the nurses, the lowest score obtained was related to the demands (2.56), while the mean score in relation to the demands among nurses was (2.32) which is lower than the HSE standard dataset (Zare et al., 2021).

An overall mean score of control was (3.26) which was below the HSE standard dataset mean (3.47), indicating low to moderate levels of control in the execution of work duties and the extent of the way that HCWs do their job. Physicians, nurses, and pharmacists' mean scores in the control dimension, (3.94), (3.94), and (3.81) respectively, which indicated moderate levels of work-related stress in relation to the control dimension, while allied health professions have significantly the highest stress score (2.56) in the control dimension, indicating that allied health professions perceived as poor the amount of control they had over their job control (Houdmont, Kerr & Randall, 2012).

The results of the current study in relation to the control dimension were parallel to Zare et al., (2021) which revealed that the physician mean score in the control (3.76), while (2.12), (2.99) among nurses and cleaning crew, respectively. This level of stress can be because of how much the worker has in the way they do their work such as the highly workload and high work pressure on workers compared to pre-pandemic conditions, direct exposure to the risks of COVID-19 situations, in addition to direct exposure to the COVID-19.

Also, the mean score of the control dimension among nurses was (3.14) according to a study conducted by Hosseinabadiet al., (2018) in Iran. This can be explained change in job control as the most important predictor for job dissatisfaction and may cause job burnout.

In managerial support, an overall mean score among all HCWs was (2.74), this was below the HSE standard dataset mean (3.46) and was significantly low with different HCWs' specialties; physicians, nurses, pharmacists, and allied health professions mean scores in the managerial support (2.33), (2.82), (2.94), and (2.16) respectively. Suggesting that across HCWs ranks perceived poor support they received from managers. Manager support was recognized as a factor in reducing the work stress of COVID-19 outbreaks at the frontline HCWs who fight against the virus (Khanam et al., 2020).Other studies results were confirming the effect of support, including manager, and colleague supports on HCWs stress and mental health levels (Cedrone et al., 2018;Khanam et al., 2020; Zare et al., 2021).Also, as stated by Hosseinabadi et al., (2018)the mean score among nurses was (3.64), which concluded that was a significant association between the mean managers support score and job satisfaction.

Furthermore, the highest score obtained is related to manager support (2.94) among pharmacists and showed the high support of managers in this occupational group. On the other hand, the physician’s mean score in managerial support was (3.87) and was (2.43) among nurses (Zare et al., 2021). Likewise, in relation to a study conducted by Khanam et al., (2020) in India, the increase in government and manager support was recognized as a factor in reducing the stress of COVID-19 outbreaks at the frontline HCWs. Also, the lack of awareness provided by higher managers of critical situations induced by the pandemic, leading to lack of suitable allocation of controls and roles in this critical situation (Zare et al., 2021).

Furthermore, the mean score for peer support was (2.50) which was below the standard mean dataset average (mean=3.78) in relation to peer support, indicating the poor amount of support a person receives from their colleagues. The lowest mean score in peer support was among allied

healthcare professions (2.16), then among physicians (2.33), and then with nurses (2.82), although the score related to the dimension of peer support among pharmacists (2.82) was higher value compared to other HCWs, it is still below the standard mean dataset. In addition, other previous studies confirm the effect of support, including manager, colleague, and even family support on staff stress and mental health levels (Zare et al., 2021; Hosseinabadi et al., 2018). These studies' results were the same as the results of the present study, yet, in contrast to counter Cedrone et al., (2018) in study performed on neurophysiological technicians, where the mean score of peer support was (3.80).

Regarding the relationship dimension, the overall score for all HCWs was (3.22), which was below the standard data set (3.85) indicating decreasing in HCWs communication at workplace which increase conflict and struggle in the workplace, and suggesting that HCWs perceived interpersonal relationships at work as being relatively not good, as concluded by Tomei et al. (2016); Cedrone et al., (2018) these studies used same questionnaire (HSE) which was used in present study even in deferent pandemic situations.

The lower score obtained in the dimensions of relationship was among pharmacists (2.76), then among nurses (3.22), and then among physicians (3.28), and other health professionals (3.51). In a study conducted by Zare et al., (2021) the mean relationship score obtained by the HCWs was (2.76), and the mean scores among nurses and physicians were (2.36) and (3.16), respectively.

Also, in the Cedrone et al. study the score related to the relationship was (4.01), this was different from the present study, it appears the difference is caused by the presence of stressful pandemic conditions, and lack of familiarity with critical conditions induced by the pandemic. (Cedrone et al., (2018).

An overall mean score of job role dimension was (2.39), below the HSE standard dataset mean(4.18), indicating incorrect perception of staff of their organization as mentioned by HSE interpretation(HSE, 2015).When HCWs recognized their role within the organization that ensures they do not have conflicting roles (Akbari et al., 2017).The highest score was among pharmacists (2.32) and physicians (2.13), while the lowest scores were among nurses (1.78) and allied healthcare professionals (1.74).The result of the present study was consistent with a study by Zare et al., (2021) that showed the mean score for nurses in relation to role dimension was (2.13), while it was (3.56) among physicians. That due to the effect of serious stressful conditions caused by COVID-19 such as lack of preceding

familiarity with the new disease, direct exposure to patient infectious disease. In addition, regarding to role subscale the findings suggest that is the most influential factor in determining job stress, also, when nurses have various roles in the healthcare system, they do not have a clear description of their job which cause a lack of role transparency among them and the expectations for a role may be in conflict with the demand for another role, consequently, role conflict occur (Hosseinabadi et al., 2018).

According to the change dimension, the overall mean score was (2.76), which likewise other dimensions still below the HSE standard data set mean was (3.04), suggesting that communication about change was particularly this due to the presence of stressful conditions, induced by the pandemic (Zare et al., 2021). Also, in same study the mean total score of the dimensions obtained by all HCWS was for changes (2.02) Zare et al., (2021). Moreover, difficult about how to organize and change the forces of an organization (HSE, 2015). In addition to the difference is caused by the presence of stressful conditions, how organizational change (large or small) is managed the work jobs and work environments and communication by higher managers in the COVID-19 which lead to less job satisfaction and medical errors (Khanam et al., 2020). However, change in relationships and environment are important factors in increasing the level of job stress (Hosseinabadi et al., 2018).

Furthermore, the highest score obtained related to the change dimension was among pharmacists (3.01), and the lower score was among other healthcare professionals (2.36), than among physicians (2.51).In another study conducted by Mirzaei et al., (2022) in Iran, to investigate work-related stress and its relationship with spiritual coping among emergency department nurses and emergency medical services staff used HSE work-related stress the results indicated the lowest levels of work-related stress were the dimensions of "demand" (2.96) and the highest was the dimension of "role" (3.89), and factors affecting the work-related stress were workplace, service location, type of employment, and work position.

4.8.2 Factors that affect work related stress

In relation to age, significant stress levels are observed in all dimensions among all HCWs in different age groups, the highest mean work related stress in all dimensions was among those the 35-39 years and more than 40 years, and among nurses was (2.40), physicians (2.77), pharmacists (2.94), and allied health profession (2.96). However, the current study findings showed that increased HCWs age was connected with an increased work related stress level, which was consistent with the studies of Alnazly et

al. (2021), Alhalaiqa et al., (2021), and Cai et al. (2020). Also, this was consistent with Zare et al., (2021) which revealed that the overall mean score in all dimensions among the 40-50 age group was (2.24). Furthermore, according to Mirzaei et al., (2022) study in Iran used HSE instrument, concluded that older nurses had increased stress level because of burnout due to age and lower physical ability to work.

In addition, other study conducted by Jones et al., (2020) which investigated the work-based risk factors and used HSE tool during Ebola epidemic in Sierra Leone, Africa. The results showed that the age and experience of HCWs increases, the ability to adapt and tolerate stressful conditions is reduced and work-related stress increased (Jones et al., 2020). That was consistent with results of Alnazly et al. (2021), which indicted those who were 40 years of age and older HCWs showed a statistically higher level of psychological distress during the COVID-19 pandemic. A potential reason for the high level of distress among older HCWs is that the risk of severe respiratory distress as a result of COVID-19 increases with age, meaning older adults are at higher risk (CDC, 2019). In contrast, a study among Jordanian nurses used Stanford Acute Stress Reaction Questionnaire, to assess the acute stress disorder and subsequent psychological distress during COVID-19 pandemic. The findings showed that younger Jordanian nurses were suffering more from psychological distress than older ones (Shahrour & Dardas, 2020).

The overall mean score of stress in all dimensions were (2.69) among female and (2.87) among male. Female healthcare workers in China were found to have more mental and psychological distress due to they fear of the infection and of spreading the virus to their families (Xiang et al., 2020) the present study findings support this result. However, being male was associated with a high level of depression, stress, and anxiety among Jordanian HCWs due to living with young children and having older persons in their extended family, which could cause them to worry about bringing the virus home to their family members (Alnazly et al. 2021).

Also in the study of Lai et al. (2020) who examined the level of stress in the HCWS including nurses and physicians exposed to COVID-19 patients in Wuhan, China indicated that being a woman and having an intermediate technical title were associated with experiencing severe depression, anxiety, and distress. In the current study, married and female HCWs had role dimension mean (2.67) and male (2.77) which indicated married female lower role levels. According to Mirzaei et al., (2022) possibly due to their responsibilities of work, family, and workload.

While the highest stress score among female HCWs was (3.21) in the relationship dimension, the highest stress score among male HCWs was significantly (4.15) in the control dimension. The findings of Mirzaei et al., (2022) study showed that the highest level of job stress is related to the demand area, which increasing the workload of nurses leads to job stress in them. In contrast, the results of Hosseinzadeh et al. (2015) showed that the lowest levels of work-related stress in nurses were related to the domains of control and demand. This can be rationalized due to male understand their roles and control on their responsibilities, and their expectations of them at work. Also, they have endured many hardships during the COVID-19 pandemic and overcome the fear of infection (Hosseinzadeh et al., 2015; Alnazly et al. 2021).

According to marital status, the mean scores in all dimensions were in single participants (2.83) and in married (2.94), which indicated that both groups had severe work related stress, but single participants were more stressed and single HCWs had a higher mean score in the control dimension (3.60) than in the married group (3.25) of the relationship dimension, which indicated that married HCWs had more family and peer support (Zare et al., 2021).

This result was not consistent with the results of Mirzaei et al., (2022) marital status and females had higher work-related stress, because of the responsibilities of work and family, such as a spouse, childcare, and job pressure (Mirzaei et al., 2022). These findings were differed from the results of Alhalaiqa et al., (2021) that the main predictor of stress and anxiety among Jordanian HCWs was being married, it could be because participants who caring for COVID-19 patients, were married, have family members and children had higher work related stress than other HCWs (Xiang et al., 2020).

In relation to education level and experience, among each education group the bachelor's degree holders had a higher work-related stress score (2.68), while master's degree holders had (2.75), and Ph.D. holders had a lower stress score (2.80), as well, they had a mean score (3.83) in relation to control dimension, which above the standard data set (3.47) indicating acceptable levels of control in the execution of work duties and the extent of the way that HCWs do their job. Mirzaei et al., (2022) findings revealed that level of education had a significant association with level of work-related stress, a bachelor's degree had more stress than those with an associate's degree, because of education increases one's knowledge and skills, and estimation to improve the quality of service and expectations (Mirzaei et al., 2022).

On the other hand, the HCWS who had more than 16 years of experience had higher work-related stress in all dimensions (2.37). Moreover, those education level (Ph.D. degree), who had a total of years of HCWs experience (16-20 years), and who worked in the ICU department were positively connected with increased work-related stress scores. The current study findings were consistent with Alnazly et al. (2021) and Alhalaiqa et al., (2021) studies; which suggested that increased length of experience was linked to more level of stress. It could be explained by the increased self-perception, self-awareness, knowledge, and orientation of the nature of the COVID-19 virus (Paolocci et al., 2021).

Moreover, HCWs who were assigned to 11 patients and more had higher stress scores (2.76) which seems to increase workload which increased work-related stress, as well, high work-related demand might have been related to high work-related stress. While those who were assigned to 6-10 patients had (2.92), and those who were assigned 1-5 patients had (2.83). As reported in a study conducted in the UK by Maben & Bridges (2020) nurses worked in ICU and assigned more patients experiencing an increase in work-related stress. Besides, the current study was consistent with a study conducted in Iran among frontline HCWs during COVID-19, the HCWs were single, had bachelor's degrees, workload, and working in isolation wards showed higher levels of stress and work-related burnout (Mirzaei et al., 2022).

However, the increased work hours were associated with more work related stress, working for 12 hours and more was a higher stress score in all dimensions (2.44), working in three shifts (2.75), and working for 8 morning hours was (2.93). Azizi et al (2021) study was conducted during COVID-19 in Iran used Depression Anxiety Stress Scale-21 (DASS-21), had similarly shown that working hours spent with COVID-19 patients were significantly increased stress and anxiety induced by COVID-19.

4.8.3The difference in the groups of predictors in work related stress

Work related stress and mental health during COVID-19 is likely to be influenced by many predictor factors. The results showed a higher level of work-related stress in female nurses compared with other HCWs participate in current study, these results are consistent with study by Zare et al., (2021) which shows a higher stress level of nurses compared with physicians. Also, many studies identified that women, nurses were particularly affected and experienced more distress compared to doctors, hence, HCWs providing direct care for long time to confirmed cases of COVID-19 were more likely to be distressed compared to those who did not

provide direct care (Shechter et al., 2020). Many studies found that being female, married, and a nurse were independent predictors of stress symptoms (Oyat et al., 2022). Furthermore, can be rationalized as; transmission of COVID-19 at home or work, deficient in organizational support, being unable to deliver competent health care, and limited disease information and communication (Xiao et al., 2020; Shechter et al., 2020). On the other hand, other previous studies reported that males were likely to suffer from work-related stress before and during COVID-19, this due to males are expected to assume more social or family responsibilities in traditional Asian cultures, and tend to assign physical work to male HCWs (Faraji et al. 2019; Davey et al. 2014).

Another predictor for work-related stress recognized in current study was the extent of HCWs experience, this study results showed HCWs with more clinical experience had more work stress, in contrast, other studies reported that less work experience were more likely to be stressed compared to HCWs with more years of work experience. Less experienced HCWs have less knowledge, skills, and are less able to self-regulate, thus they get stressed more easily compared to more experienced HCWs who have more knowledge and skills, and are thus able to adapt (Sun et al., 2022; Kushal et al., 2018).

In relation to age, the results showed that age ranged between 36-40 years and more had more work stress, this was similar to systematic review was conducted by Oyat et al., (2022)across 12 studies to determine the prevalence of stress symptoms among HCWs during COVID-19, which indicated age was associated with anxiety, and stress symptoms than their younger HCWs (Oyat et al., 2022).However, the present study findings were consistent with studies of Alnazly et al. (2021) and Alhalaiqa et al., (2021)showed increased HCWs age was correlated with an increased stress level, which could be rationalized by that HCWs concerned with COVID-19 are exhausted because of prolonged work hours, personal concerns, health issues that make them more prone to complications, and family health. In contrast, a cross-sectional comparative study revealed that younger Jordanian nurses were suffering more from psychological distress than older ones (Shahrour & Dardas's, 2020).

Furthermore, present study found that HCWs work in different or alternative three shift and whom worked for 12 hours during COVID-19 had more work related stress, this was supported by Luceno-Moreno et al. (2020) who indicated that long working hours among Spanish HCWs cause psychological problems. Also, working long shifts, 12 hours and more, was connected with more risk of sickness absence for registered nurses and allied

health profession (Dall'Ora et al., 2019). Therefore, HCWs should to take vacations from work for getting relax and to reducing psychological distress during the pandemic (Alnazly et al., 2021).

The study results indicated that nurses assigned to 11 patients or more and working in ICU departments and emergency rooms had more work related stress, that were concurrent with other studies reported that type of profession, and working environment were significant factors for stress symptoms (Alnazly et al., 2021; Oyat et al., 2022). Which due to increase acuity of care and increased patients' number, also, uncertainty HCWs safety, could result of reusing of personal protective equipment, all of these are challenges that produced by the pandemic brining to HCWs (Wong et al., 2020).

These differences between findings might be rationalized by the use of different instruments, and indicated the need to conduct future research with a large sample size focusing on the correlation of demographics with these psychological distresses

4.9 Conclusion and Recommendations:

The present study offered evidence of work related stress among HCWs in frontline hospitals during the COVID-19 epidemic in Jordan. Significant high levels of work related stress among Jordanian HCWs can be rationalized by a lack of previous experience in a similar situation and increased in workload. The management standards for work related stress reference for management dimension standards include two key components. First, a set of statements of good management practice (demands, control, managerial support, peer support, relationships, role, change) that if not appropriately managed can cause health impairment. The second component is a procedure and toolkit for the assessment and reduction of exposure to psychosocial hazards (Houdmont, Kerr & Randall, 2012). Many predictor factors were associated with work related stress. Therefore, improving increasing managerial support for staff, decreasing workplace demands, and improving staff communication to reduce the stress level of HCWs during the outbreak of COVID-19. Mirzaei et al., (2022) concluded the need to improve the work environment for medical services staff, involving changes in physical working conditions, salaries, and better employment conditions. Also, the results of current study about work-related stress and mental health status among HCWs care to COVID-19 patients, are suggested to health administrators and policymakers at the RMS to provide psychological screening and supportive psychological programs for HCWs

with the purpose of improving their mental health status and effective coping with critical conditions.

4.10 Study Limitations:

1. Recall bias may have been associated with responses on the scale because the information was self-reported, and due to the convenient sampling technique followed in the study a convenience sample absence of a representative result and the sample size of the respondents. As well as the reliability of the responses and non-bias due to fear of giving true responses to the statements on the tool. Bias may enter into the data because only certain types of HCWs receive an opportunity to participant instead of the selecting randomly.
2. This study is cross-sectional in nature and relied on HSE Management standard tool, and it is the descriptive nature, different research methodologies (i.e. qualitative or mixed-methods design) are required to further detailed and rich understanding of HCW's psychological and mental well-being during COVID-19 outbreak.
3. the study time was conducted at the end of COVID-19 outbreak; the timing of data collection was limited. Data was collected based on the time available for the HCWs as it was collected during the end peak situation of the wave of the outbreak in Jordan.

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Appendix I

English version of Executive Health and Safety management standards Indicators Tool

	Always	Mostly	Sometimes	Rarely	Never
1. I am clearly aware of what is expected of me at work	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
2. I can decide when to take a break	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
3. Diverse groups at work requesting from me things that are hard to combine	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
4. I am acknowledged about the method of finishing my job	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
5. I am personally harassed in the form of unfriendly words or behavior	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
6. I have unattainable deadlines	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
7. If work gets difficult, my colleagues help me	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
8. I get supportive feedback on the work I do	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
9. I have to work very intensely	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
10. I have the right to decide how quickly I do the work	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
11. I clearly recognize what my duties and responsibilities are.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
12. I have to neglect some tasks because I have so much to do.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
13. I clearly recognize the goals and objectives of my department.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
14. There's tension or anger between colleagues.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

15. I have the right to decide how to do my job.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
16. I'm not able to take enough breaks.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
17. I know how my work fits into the overall objective of the Organization.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
18. I get pressured to work long hours	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
19. I have a choice in deciding what to do at work.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
20. I have to work really fast.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
21. I'm bullied at work.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
22. I have unrealistic time pressures.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
23. I can rely on my line manager to help me with a business problem.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
	strongly agree	agree	neutral	disagree	strongly disagree
24. I get the help and support I need from colleagues.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
25. I have the right to decide the way I work to some extent.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
26. I have enough opportunities to inquire about changes in work from managers.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
27. I get the respect I deserve at work from my colleagues.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
28. Employees are always consulted about changes in employment	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

29. I can talk to my line manager about something that's pissed me off or bothered me about work.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
30. My working time can be flexible	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
31. My colleagues are ready to listen to my work problems.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
32. In making changes in the work, I clearly realize how it will be applied in practice.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
33. I get support when doing emotionally demanding work.	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
34. Relationships at work are tense	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐
35. My line manager encourages me at work	1 ☐	2 ☐	3 ☐	4 ☐	5 ☐

Appendix II

Arabic version of Executive Health and Safety management standards Indicators Tool

إن تأثير ظروف العمل على رفاه العاملين من الأمور المسلم بها. ستساعدنا استجاباتك على الأسئلة الواردة أدناه في تحديد ظروف عملنا الحالية، وتمكننا من رصد التحسينات المستقبلية. إن انعكاس استجاباتك لعملك خلال الأشهر الستة الماضية ضروري لنتمكن من مقارنة الوضع الحالي بالأوضاع الماضية أو المستقبلية.

	دائماً	غالباً	أحياناً	نادراً	أبداً
أدرك بوضوح ما هو متوقّع مني في العمل	1	2	3	4	5
يمكنني أن أقرر متى آخذ استراحة	1	2	3	4	5
المجموعات المختلفة في العمل تطالبني بأمور يصعب الجمع بينها	1	2	3	4	5
أنا أعلم كيفية إتمام عملي	1	2	3	4	5
أتعرض للمضايقات الشخصية على شكل كلمات أو سلوكيات غير ودودة	1	2	3	4	5
لدي مواعيد نهائية غير قابلة للتحقيق	1	2	3	4	5
إن أصبح العمل صعباً، يساعدني زملائي	1	2	3	4	5
أنا أحصل على تغذية راجعة داعمة حول العمل الذي أقوم به	1	2	3	4	5
يجب أن اعمل بشكل مكثف جداً	1	2	3	4	5
لدي الحق في تقرير مدى سرعة قيامي بالعمل	1	2	3	4	5
أدرك بوضوح ما هي واجباتي ومسؤولياتي	1	2	3	4	5
يجب علي إهمال بعض المهام لأن لدي الكثير جداً للقيام به	1	2	3	4	5
أدرك بوضوح أهداف وغايات قسمي	1	2	3	4	5
هناك توتر أو غضب بين الزملاء	1	2	3	4	5
لدي الحق في أن أقرر كيفية قيامي بعملي	1	2	3	4	5
أنا غير قادر على أخذ استراحات كافية	1	2	3	4	5

17	أنا أعلم كيف ينسجم عملي مع الهدف العام للمنظمة	☐ 1 دائماً	☐ 2 غالباً	☐ 3 أحياناً	☐ 4 نادراً	☐ 5 أبداً
18	أتعرّض للضغط للعمل ساعات طويلة	☐ 1 دائماً	☐ 2 غالباً	☐ 3 أحياناً	☐ 4 نادراً	☐ 5 أبداً
19	لدي الخيار في تقرير ما أقوم به في العمل	☐ 1 دائماً	☐ 2 غالباً	☐ 3 أحياناً	☐ 4 نادراً	☐ 5 أبداً
20	يجب علي أن أعمل بسرعة كبيرة	☐ 1 دائماً	☐ 2 غالباً	☐ 3 أحياناً	☐ 4 نادراً	☐ 5 أبداً
21	أنا أتعرض للتنمر في العمل	☐ 1	☐ 2	☐ 3	☐ 4	☐ 5

22 لدي ضغوط زمنية غير واقعية	دائماً 1	غالباً 2	أحياناً 3	نادراً 4	أبداً 5
23 يمكنني الاعتماد على مديري المباشر من أجل مساعدتي بمشكلة بخصوص العمل	دائماً 1	غالباً 2	أحياناً 3	نادراً 4	أبداً 5
24 أنا أحصل على المساعدة والدعم الذي أحتاجه من الزملاء	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
25 لدي الحق في تقرير الطريقة التي أعمل بها إلى حد ما	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
26 أملك فرص كافية للاستفسار عن التغييرات في العمل من المدراء	أوافق بشده 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
27 أنا أحصل على الاحترام الذي استحقه في العمل من زملائي	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
28 يتم استشارة العاملين دائماً حول التغييرات في العمل	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
29 يمكنني أن أتحدث لمديري المباشر عن أمر ما أغضبني أو أزعجني حول العمل	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
30 يمكن أن يكون وقت عملي مرناً	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
31 زملائي مستعدون للاستماع لمشاكلي المتعلقة بالعمل	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
32 عند إجراء تغييرات في العمل، أدرك بوضوح كيف ستطبق من الناحية العملية	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
33 أحظى بالدعم عند قيامي بأعمال متطلبة عاطفياً	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
34 العلاقات في العمل متوترة	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5
35 مديري المباشر يشجعني في العمل	أوافق بشدة 1	أوافق 2	محايد 3	لا أوافق 4	لا أوافق بشدة 5

شكراً لإكمالك الاستبيان.

Executive Health and Safety management standards

Indicators Tool

The impact of working conditions on the well-being of workers is recognized. Your responses to the questions below will help us identify our current working conditions and enable us to monitor future improvements, reflecting your responses to your work over the past six months is essential to enable us to compare the current situation with past or future situations.

المعلومات الشخصية

الاسم: آمنة فهيد خليل الفليح

التخصص: ماجستير إدارة الصحة العامة

الكلية: الطب

سنة التخرج: 2023