

Determinant factors related to stress, resilience, and depression among health workers during the COVID-19 pandemic in Indonesia

Sulidah Sulidah^{1*}, Tri Astuti Sugiyatmi¹, Ferry Efendi², Ika Adelia Susanti³, Angeline Bushy⁴

¹ Faculty of Health Sciences, Universitas Borneo Tarakan, Tarakan, INDONESIA

² Faculty of Nursing, Universitas Airlangga, Surabaya, INDONESIA

³ Faculty of Health Science, Universitas Dr. Soebandi, Jember, INDONESIA

⁴ College of Nursing, University of Central Florida, Orlando, FL, USA

*Corresponding Author: sulidah06@gmail.com

Citation: Sulidah S, Sugiyatmi TA, Efendi F, Susanti IA, Bushy A. Determinant factors related to stress, resilience, and depression among health workers during the COVID-19 pandemic in Indonesia. *Electron J Gen Med.* 2024;21(2):em581. <https://doi.org/10.29333/ejgm/14484>

ARTICLE INFO

Received: 08 Mar. 2023

Accepted: 14 Jun. 2023

ABSTRACT

Background: The COVID-19 pandemic has had an impact not only on physical health but also on mental and emotional health. The extensive spread of the virus has led to an unbalanced ratio of health workers to patients. This situation can trigger the onset of stress and depression in healthcare workers, and resilience can help to alleviate mental symptoms. The study aims to analyze the impact of the COVID-19 pandemic on stress, resilience, and depression among healthcare workers in health facilities in Indonesia.

Method: This was a quantitative study with a cross-sectional approach. It involved healthcare workers in hospitals managing COVID-19 patients. 117 respondents were selected using random sampling techniques. The instruments used were the ER-14 resilience scale, COVID stress scale, and PHQ-9 depression scale. The data analysis involved chi-square and logistic regression.

Results: Age (odds ratio [OR]=43.27; 95% confidence interval [CI]=3.01-620.98), number of children (OR=0.21; 95% CI=0.06-0.71), family dependents (OR=0.02; 95% CI=0.00-0.56), and civil servant employee status (OR=0.08; 95% CI=0.01-0.65) were significantly associated with stress among healthcare workers. In terms of resilience, the number of children was an influential determinant (OR=0.17; 95% CI=0.03-0.90), and the number of children (OR=0.21; 95% CI=0.05-0.88), family dependents (OR=11.07; 95% CI=2.12-57.82), work schedule (OR=0.23; 95% CI=0.06-0.90), and work status (OR=0.05; 95% CI=0.00-0.51) were related to depression.

Conclusions: The findings indicate several demographical and employment factors that contribute to stress, resilience, and depression among healthcare workers during the COVID-19 pandemic in Indonesia. Policy structure is needed to support these workers during the COVID-19 pandemic, especially to ease the burden of domestic responsibility.

Keywords: COVID-19, depression, healthcare workers, resilience, stress

INTRODUCTION

The outbreak of coronavirus disease 2019 (COVID-19) was declared a global pandemic by the World Health Organization (WHO) on March 11, 2020 [1]. The virus originated in Wuhan, China and spread throughout the world rapidly [2]. As of February 18, 2021, the COVID-19 virus had infected more than 418 million people worldwide, with 5.8 million deaths [3]. In Indonesia, data from the Task Force for the Acceleration of Handling Corona Virus Disease 2019 (Satgas COVID-19) as of February 18, 2022, reveals that as many as five million people have been infected with COVID-19, 456,000 people are currently being treated, and 145,000 have died [4]. These emergencies have prompted healthcare workers to experience an unconscious psychological condition that manifests as anxiety, stress, or even depression [5-7].

This psychological conditions can also occur in healthcare workers as they are at high risk of infection due to exposure to

patients along with their heavy workload [8]. A study conducted in China showed that symptoms of depression, somatization, and anxiety were higher in healthcare workers in COVID-19 referral hospitals than those in non-COVID-19 referral hospitals [9]. In Indonesia, the ratio of nurses to patients has increased during the pandemic associated with increased workload and daily shift patterns [10]. Even before the pandemic, nurses were identified as workers vulnerable to high levels of stress and anxiety due to their experiencing great challenges and demands [11, 12].

Another study showed that anxiety has been a factor for nurses caring for COVID-19 patients during the pandemic [13, 14], and a further study found that most healthcare professionals have experienced significant levels of anxiety, depression, and insomnia during the COVID-19 pandemic [15]. Nurse resilience analysis is needed to understand the mechanisms used by nurses for dealing with pandemic stressors. Resilience is defined as a positive adaptation to adversity [16].

Factors that play a role in resilience are social support and personal resources such as frame of reference and feelings that help relieve stress and overcome psychological barriers [17]. Other factors, such as peer support and crisis communication strategies, have also been highlighted as factors that might drive resilience [18]. However, it is necessary to study specific factors that can enhance the understanding of increased nurse resilience and how nurses can manage stress and depression, especially during the COVID-19 pandemic. This study aims to analyze the impact of the COVID-19 pandemic on stress, resilience, and depression among healthcare workers in health facilities.

METHOD

Study Design

This is a quantitative study using a cross-sectional design, and it intends to explain the relationship between variables by conducting cross-sectional hypothesis testing.

Study Population and Sample

Population in the study comprised healthcare workers who were registered as COVID-19 volunteers at COVID-19 referral hospitals. The inclusion criteria of this study were, as follows:

- (1) healthcare workers who managed COVID-19 cases and
- (2) those willing to follow the procedures required of the research respondents.

Participation in the study was entirely voluntary, and healthcare workers who refused to participate were not included in the study. A total population, 117 respondents were completed this survey as a self-selecting sample.

Study Variables and Measurement

The resilience of healthcare workers was measured using a validated ER-14 resilience scale [19]. This instrument relates to several elements, including personal competence (self-confidence, independence, decision-making, ingenuity, and perseverance) and acceptance of life (adaptation, balance, flexibility, and perspective on life). The scale ranges from 14 points (minimum) to 98 points (maximum) and is categorized as high (≥ 84) and low (< 84). Stress was measured using a COVID-19 stress scale that is available in various languages and has been validated [20], measuring how often situations were perceived as stressful by healthcare workers.

The scale has 36 question items with four answer choices (0: never, 1: sometimes, 2: often, and 3: always). The total score ranges from 0 to 144 points, with a score of ≥ 44 categorized as stress and < 44 as no stress.

Depression was measured using a validated PHQ-9 depression scale [21, 22], which assessed symptoms that fit the DSM-IV criteria for depression. PHQ-9 evaluated the presence of criteria for major depressive disorder during the previous two weeks using nine items. Each item is scored from 0 to 27 and is graded on a four-point scale, from 0 (not at all) to 3 (almost daily). A greater severity of symptoms indicates a greater likelihood of major depressive disorder. A threshold of 10 or more is deemed diagnostic [23]. The ad-hoc questionnaire used was similar to that used in a study conducted in Spain [24].

Data Analysis

Descriptive analysis was used to describe each of the research variables. The association between the covariate variable and the outcome variable was assessed using a binary logistic regression test with an odds ratio (OR) and 95% confidence interval (CI). STATA 14 application software was used to perform the analysis, and $p < 0.05$ was considered statistically significant.

RESULTS

Characteristics of Study Participants

The results of the demographic data analysis of respondents reveal that healthcare workers aged 30-44 years experienced more stress, with 35 respondents (56.5%), than healthcare workers under 30 years or more than 45 years. Most stress occurred in healthcare workers who were female (55.7%), bachelor/profession-educated (56.1%), married (54.0%), had two children (65.1%), worked as nurses (55.3%), and had three family dependents (52.8%). The stress experienced by healthcare workers was also related to the number of working hours, with those working > 40 hours per week either before (52.2%) or during (50.0%) the pandemic and those with a non-shift work schedule (59.1%) experiencing more stress. Healthcare workers who were permanent employees (civil servants) showed higher stress outcomes, with 48 respondents (58.5%), than workers who were non-civil servants or non-permanent employees (**Table 1**).

Table 1. Frequency distribution of study participants

| Variable | Stress n (%) | | | Resilience n (%) | | | Depression n (%) | | |
|----------------------------|--------------|-----------|-------------|------------------|-----------|-------------|------------------|-----------|-------------|
| | Yes | No | Total | Low | High | Total | Yes | No | Total |
| Age (years) | | | | | | | | | |
| <30 | 4 (28.6) | 10 (71.4) | 14 (100.0) | 7 (50.0) | 7 (50.0) | 14 (100.0) | 9 (64.3) | 5 (35.7) | 14 (100.0) |
| 30-44 | 35 (56.5) | 27 (43.5) | 62 (100.0) | 28 (45.2) | 34 (54.8) | 62 (100.0) | 20 (32.3) | 42 (67.7) | 62 (100.0) |
| ≥ 45 | 25 (61.0) | 16 (39.0) | 41 (100.0) | 21 (51.2) | 20 (48.8) | 41 (100.0) | 15 (36.6) | 26 (63.4) | 41 (100.0) |
| Gender | | | | | | | | | |
| Male | 25 (53.2) | 22 (46.8) | 47 (100.0) | 23 (48.9) | 24 (51.1) | 47 (100.0) | 15 (31.9) | 32 (68.1) | 47 (100.0) |
| Female | 39 (55.7) | 31 (44.3) | 70 (100.0) | 33 (47.1) | 37 (52.9) | 70 (100.0) | 29 (41.4) | 41 (58.6) | 70 (100.0) |
| Education | | | | | | | | | |
| Diploma degree | 24 (50.0) | 24 (50.0) | 48 (100.0) | 21 (43.8) | 27 (56.3) | 48 (100.0) | 19 (39.6) | 29 (60.4) | 48 (100.0) |
| Bachelor/profession degree | 32 (56.1) | 25 (43.9) | 57 (100.0) | 29 (50.9) | 28 (49.1) | 57 (100.0) | 19 (50.0) | 38 (66.7) | 57 (100.0) |
| Master/doctoral degree | 8 (66.7) | 4 (33.3) | 12 (100.0) | 6 (50.0) | 6 (50.0) | 12 (100.0) | 6 (33.3) | 6 (50.0) | 12 (100.0) |
| Marital status | | | | | | | | | |
| Single | 10 (58.8) | 7 (41.2) | 17 (100.0) | 8 (47.1) | 9 (52.9) | 17 (100.0) | 6 (35.3) | 11 (64.7) | 17 (100.0) |
| Married | 54 (54.0) | 46 (46.0) | 100 (100.0) | 48 (48.0) | 52 (52.0) | 100 (100.0) | 38 (38.0) | 62 (62.0) | 100 (100.0) |

Table 1 (Continued). Frequency distribution of study participants

| Variable | Stress n (%) | | | Resilience n (%) | | | Depression n (%) | | |
|--|--------------|-----------|-------------|------------------|-----------|-------------|------------------|-----------|-------------|
| | Yes | No | Total | Low | High | Total | Yes | No | Total |
| Number of children | | | | | | | | | |
| 0 | 10 (52.6) | 9 (47.4) | 19 (100.0) | 7 (36.8) | 12 (63.2) | 19 (100.0) | 6 (31.6) | 13 (68.4) | 19 (100.0) |
| 1 | 12 (52.2) | 11 (47.8) | 23 (100.0) | 16 (69.6) | 7 (30.4) | 23 (100.0) | 11 (47.8) | 12 (52.2) | 23 (100.0) |
| 2 | 28 (65.1) | 15 (34.9) | 43 (100.0) | 17 (39.5) | 26 (60.5) | 43 (100.0) | 14 (32.6) | 29 (67.4) | 43 (100.0) |
| 3 | 14 (43.8) | 18 (56.3) | 32 (100.0) | 16 (50.0) | 16 (50.0) | 32 (100.0) | 13 (40.6) | 19 (59.4) | 32 (100.0) |
| Occupation | | | | | | | | | |
| Doctor | 10 (50.0) | 10 (50.0) | 20 (100.0) | 12 (60.0) | 8 (40.0) | 20 (100.0) | 8 (40.0) | 12 (60.0) | 20 (100.0) |
| Nurse | 52 (55.3) | 42 (44.7) | 94 (100.0) | 41 (43.6) | 53 (56.4) | 94 (100.0) | 35 (37.2) | 59 (62.8) | 94 (100.0) |
| Other | 2 (66.7) | 1 (33.3) | 3 (100.0) | 3 (100.0) | 0 (0.0) | 3 (100.0) | 1 (33.3) | 2 (66.7) | 3 (100.0) |
| Family dependents | | | | | | | | | |
| 0 | 10 (47.6) | 11 (52.4) | 21 (100.0) | 11 (52.4) | 10 (47.6) | 21 (100.0) | 8 (38.1) | 13 (61.9) | 21 (100.0) |
| 1 | 11 (91.7) | 1 (8.3) | 12 (100.0) | 6 (50.0) | 6 (50.0) | 12 (100.0) | 1 (8.3) | 11 (91.7) | 12 (100.0) |
| 2 | 15 (48.4) | 16 (51.6) | 31 (100.0) | 13 (41.9) | 18 (58.1) | 31 (100.0) | 18 (58.1) | 13 (41.9) | 31 (100.0) |
| 3 | 28 (52.8) | 25 (47.2) | 53 (100.0) | 26 (49.1) | 27 (50.9) | 53 (100.0) | 17 (32.1) | 36 (67.9) | 53 (100.0) |
| Number of hours worked before the pandemic | | | | | | | | | |
| ≤40 hours per week | 28 (58.3) | 20 (41.7) | 48 (100.0) | 26 (54.2) | 22 (45.8) | 48 (100.0) | 14 (29.2) | 34 (70.8) | 48 (100.0) |
| >40 hours per week | 36 (52.2) | 33 (47.8) | 69 (100.0) | 30 (43.5) | 39 (56.5) | 69 (100.0) | 30 (43.5) | 39 (56.5) | 69 (100.0) |
| Number of hours worked during the pandemic | | | | | | | | | |
| ≤40 hours per week | 30 (61.2) | 19 (38.8) | 49 (100.0) | 27 (55.1) | 22 (44.9) | 49 (100.0) | 14 (28.6) | 35 (71.4) | 49 (100.0) |
| >40 hours per week | 34 (50.0) | 34 (50.0) | 68 (100.0) | 29 (42.6) | 39 (57.4) | 68 (100.0) | 30 (44.1) | 38 (55.9) | 68 (100.0) |
| Working schedule | | | | | | | | | |
| Shift | 25 (49.0) | 26 (51.0) | 51 (100.0) | 25 (49.0) | 26 (51.0) | 51 (100.0) | 20 (39.2) | 31 (60.8) | 51 (100.0) |
| Non-shift | 39 (59.1) | 27 (40.9) | 66 (100.0) | 31 (47.0) | 35 (53.0) | 66 (100.0) | 24 (36.4) | 42 (63.6) | 66 (100.0) |
| Employment status | | | | | | | | | |
| Civil servant | 48 (58.5) | 34 (41.5) | 82 (100.0) | 39 (47.6) | 43 (52.4) | 82 (100.0) | 26 (31.7) | 56 (68.3) | 82 (100.0) |
| Permanent employee | 12 (52.2) | 11 (47.8) | 23 (100.0) | 10 (43.5) | 13 (56.5) | 23 (100.0) | 12 (52.2) | 11 (47.8) | 23 (100.0) |
| Non-permanent employee | 4 (33.3) | 8 (66.7) | 12 (100.0) | 7 (58.3) | 5 (41.7) | 12 (100.0) | 6 (50.0) | 6 (50.0) | 12 (100.0) |
| Total | 64 (54.7) | 53 (45.3) | 117 (100.0) | 56 (47.9) | 61 (52.1) | 117 (100.0) | 44 (37.6) | 73 (62.4) | 117 (100.0) |

Resilience is defined as having a healthful adaptation process when facing difficult conditions, trauma, tragedy, anguish, or significant stress [25]. The results of the study show that 34 (54.8%) healthcare workers aged 30-44 years had higher resilience than those in other age brackets. In terms of gender, women had higher (52.9%) resilience than men. High resilience was found in respondents who had a diploma education (56.3%), were married (52.0%), had two children (60.5%), worked as nurses (56.4%), or had three family dependents (50.9%). A higher level of resilience was also found in respondents who worked >40 hours per week before or during the pandemic, with many working non-shifts (53.0%) and being permanent employees or civil servants (52.4%) (Table 1).

The results show that respondents who experienced depression the most were aged 30-44 years (32.3%), female (41.4%), educated with a bachelor/profession degree (50.0%), married (38.0%), had two children (32.6%), worked as nurses (37.2%), or had two family dependents (58.1%). Depression was more prevalent in healthcare workers who worked >40 hours per week before or during the pandemic, had a non-shift work schedule (36.4%), or were civil servants (31.7%) (Table 1).

Factors Associated With Stress, Resilience, and Depression

Table 2 lists the determinants of the impact of the COVID-19 pandemic on stress, resilience, and depression in healthcare workers. In terms of stress, there are several determinants: age, number of children, family dependents, and civil servant status. Healthcare workers aged <30 years were 43 times more at risk of stress than those aged ≥45 (OR=43.27; 95% CI=3.01-20.98).

Respondents with two children had a lower tendency to experience stress, by 0.2 times, than those with three children (OR=0.21; 95% CI=0.06-0.71). Healthcare workers who had one

family dependents experienced lower stress, by 0.02 times, than those with three family dependents (OR=0.02; 95% CI=0.00-0.56). Moreover, healthcare workers who were civil servants were 0.08 times more likely to be stressed than those who were non-permanent employees (OR=0.08; 95% CI=0.01-0.65).

In terms of resilience, the number of children was an influential determinant. Healthcare workers with one child tended to have 0.2 lower resilience than those with three children (OR=0.17; 95% CI=0.03-0.90). Moreover, for depression, there were several factor determinants, namely the number of children, family dependents, work schedules, and employment status. Healthcare workers who had two children were 0.21 times less at risk of depression than those with three children (OR=0.21; 95% CI=0.05-0.88). Healthcare workers who had two family dependents were 11.07 times more at risk of depression than those with three family dependents (OR=11.07; 95% CI=2.12-57.82). Healthcare workers who had a shift work schedule were 0.23 times less at risk of depression than those who worked non-shift patterns (OR=0.23; 95% CI=0.06-0.90), and those who were civil servants had a lower risk of depression than those who were non-permanent employees (OR=0.05; 95% CI=0.00-0.51) (Table 2).

DISCUSSION

This study provides insight into the stress experienced by healthcare workers during the COVID-19 pandemic. Healthcare workers aged <30 years were more likely to experience stress than those aged ≥45. Consistent with previous studies, age was associated with stress [26, 27]. Stress occurring in younger adults can be attributed to lower emotional control ability,

Table 2. Binary logistic regression for factors associated with stress, resilience, & depression

| Variable | Stress ^a | | | | Resilience ^a | | | | Depression ^a | | | |
|--|---------------------|-------|-------|--------|-------------------------|-------|-------|-------|-------------------------|-------|-------|-------|
| | OR | Sig. | Total | | OR | Sig. | Total | | OR | Sig. | Total | |
| | | | Lower | Upper | | | Lower | Upper | | | Lower | Upper |
| Age (years) | | | | | | | | | | | | |
| <30 | 43.27 | 0.01* | 3.01 | 620.98 | 0.51 | 0.53 | 0.07 | 4.04 | 0.82 | 1.00 | 0.00 | 0.00 |
| 30-44 | 1.44 | 0.49 | 0.51 | 4.07 | 1.50 | 0.42 | 0.56 | 4.02 | 2.22 | 0.19 | 0.67 | 7.30 |
| ≥45 | - | - | - | - | - | - | - | - | - | - | - | - |
| Gender | | | | | | | | | | | | |
| Male | 0.85 | 0.74 | 0.33 | 2.18 | 1.33 | 0.52 | 0.56 | 3.16 | 0.43 | 0.13 | 0.14 | 1.29 |
| Female | - | - | - | - | - | - | - | - | - | - | - | - |
| Education | | | | | | | | | | | | |
| Diploma degree | - | - | - | - | - | - | - | - | - | - | - | - |
| Bachelor/profession degree | 1.14 | 0.80 | 0.42 | 3.05 | 1.40 | 0.47 | 0.57 | 3.43 | 0.96 | 0.94 | 0.32 | 2.84 |
| Master/doctoral degree | 0.75 | 0.71 | 0.16 | 3.45 | 1.18 | 0.83 | 0.27 | 5.05 | 4.85 | 0.09 | 0.80 | 29.32 |
| Marital status | | | | | | | | | | | | |
| Single | 0.12 | 0.11 | 0.01 | 1.65 | 0.47 | 0.35 | 0.10 | 2.28 | 0.32 | 0.36 | 0.03 | 3.63 |
| Married | - | - | - | - | - | - | - | - | - | - | - | - |
| Number of children | | | | | | | | | | | | |
| 0 | 0.47 | 0.64 | 0.02 | 11.35 | 6.12 | 0.13 | 0.60 | 62.48 | 0.00 | 1.00 | 0.00 | 0.00 |
| 1 | 0.43 | 0.30 | 0.09 | 2.15 | 0.17 | 0.04* | 0.03 | 0.90 | 0.41 | 0.33 | 0.07 | 2.49 |
| 2 | 0.21 | 0.01* | 0.06 | 0.71 | 1.08 | 0.90 | 0.36 | 3.21 | 0.21 | 0.03* | 0.05 | 0.88 |
| 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| Family dependents | | | | | | | | | | | | |
| 0 | 0.77 | 0.73 | 0.18 | 3.40 | 0.88 | 0.86 | 0.22 | 3.49 | 1.48 | 0.64 | 0.28 | 7.71 |
| 1 | 0.02 | 0.02* | 0.00 | 0.56 | 1.44 | 0.69 | 0.24 | 8.76 | 0.00 | 1.00 | 0.00 | 0.00 |
| 2 | 2.40 | 0.20 | 0.62 | 9.31 | 2.83 | 0.12 | 0.75 | 10.63 | 11.07 | 0.00* | 2.12 | 57.82 |
| 3 | - | - | - | - | - | - | - | - | - | - | - | - |
| Number of hours worked before the pandemic | | | | | | | | | | | | |
| ≤40 hours per week | 1.36 | 0.59 | 0.45 | 4.12 | 0.82 | 0.70 | 0.30 | 2.24 | 0.72 | 0.60 | 0.20 | 2.52 |
| >40 hours per week | - | - | - | - | - | - | - | - | - | - | - | - |
| Number of hours worked during the pandemic | | | | | | | | | | | | |
| ≤40 hours per week | 0.69 | 0.51 | 0.23 | 2.09 | 0.51 | 0.22 | 0.18 | 1.47 | 0.64 | 0.48 | 0.18 | 2.22 |
| >40 hours per week | - | - | - | - | - | - | - | - | - | - | - | - |
| Working schedule | | | | | | | | | | | | |
| Shift | 0.65 | 0.44 | 0.21 | 1.94 | 0.74 | 0.56 | 0.26 | 2.08 | 0.23 | 0.03* | 0.06 | 0.90 |
| Non-shift | - | - | - | - | - | - | - | - | - | - | - | - |
| Employment status | | | | | | | | | | | | |
| Civil servant | 0.08 | 0.02* | 0.01 | 0.65 | 2.81 | 0.21 | 0.56 | 14.16 | 0.05 | 0.01* | 0.00 | 0.51 |
| Permanent employee | 0.21 | 0.17 | 0.02 | 1.99 | 4.53 | 0.10 | 0.76 | 27.14 | 0.26 | 0.27 | 0.02 | 2.87 |
| Non-permanent employee | - | - | - | - | - | - | - | - | - | - | - | - |

Note. ^aBinary logistic regressions were used to investigate determinant factors of stress, resilience, & depression & *p-value<0.05

with older adults being considered more capable of emotional control [26]. Another study stated that older people have more experience and better problem-solving skills than younger people [28, 29]. Younger adults are perceived as being at a stage that involves seeking self-stability, having many problems, emotional tension, and adjustments to a new lifestyle [29]. This affects the ability of positive emotional management in responding to stress. In addition, healthcare workers with two children were less likely to experience stress than those with three children. This aligns with a previous study that found healthcare workers with more than two children experienced higher levels of parenting stress [30]. This can be due to limited financial resources, owing to having to share money among children, or unstable conditions, such as educational issues during the pandemic. A study conducted in Japan reported that parental stress increased when schools were closed [31]. By identifying age and number of children as key determinants in the experience of stress among healthcare workers, potential interventions to assist alleviate stress and enhance the well-being of healthcare workers can be focused.

Healthcare workers with one family dependents were less likely to experience stress than those with three family dependents. The number of family members significantly

affected stress levels [32]. The study revealed that that more family members meant performing more roles and tending to more basic needs, including healthcare services, during the pandemic [32, 33]. Moreover, a stressful condition increased domestic violence during the pandemic because of failure to meet the demands of dependent family members [33]. This study also analyzed occupational status, with civil servant status emerging as one of the determinant factors of stress among healthcare workers. Healthcare workers who were employed as civil servants were less likely to experience stress than those employed in non-permanent positions. This is associated with job satisfaction [34]. For example, civil servant nurses have opportunities to achieve job satisfaction, related to remuneration or compensation in hospitals [34, 35], while non-civil servants have a lack of opportunities to receive high salaries and career promotions, impacting their daily needs [36]. Meeting daily needs during the pandemic increased the possibility of stress in non-permanent workers.

Furthermore, the current study found that the number of children was an influential determinant of resilience status. Healthcare workers who had one child were less likely to have high resilience than those with three children. These results are supported by a study conducted in Turkey, which showed that

resilience was determined by having more children [37]. This outcome is related to healthcare workers' social support and personal circumstances that can make it easier for them to face their problems [38]. A previous study also showed that having a partner and children correlated with better levels of resilience in healthcare professionals [39, 40]. This study was conducted during the COVID-19 transition period, so it could be said that the healthcare workers have been able to adapt and adjust to long-term psychological consequences.

Moreover, the current study assessed determinant factors related to depression among healthcare workers during the COVID-19 pandemic. There were several determinant factors: the number of children, family dependents, work schedules, and employment status. Healthcare workers who had two children were less likely to experience depression than those with three children. Healthcare workers have great potential to experience high depression levels, and depression is one of the psychological responses of healthcare workers to the pandemic [41]. It could be argued that these workers having more children can increase depression because they need to fulfil parental responsibilities and maintain their children's health status. A similar study showed that workload among healthcare workers can adversely impact their families, including children at home [42]. Shift schedule was also related to depression. Healthcare workers who had a shift-work schedule were 0.25 times less likely to experience depression than those with non-shift schedules. This aligns with a previous study that showed nurses who work non-shift schedules had a higher prevalence of depression [43]. Healthcare workers who worked only the morning shift presented with higher psychological health disorder levels, related to higher levels of burnout [44]. Furthermore, a stressful environment during a pandemic may result in individual symptoms of depression. Our study also found that employment status is related to depression among health workers, where civil servants tend to have a lower risk than non-permanent employers. Similar to previous study, workers in more vulnerable work environments, such as temporary, contract, or part-time workers, were more likely to express symptoms of depression and anxiety than those in more secure work situations, such as full-time and regular workers, across all industries [45]. According to previous study, financial stress plays a major role in decreasing mental health among key employees, and it helps to explain the disparities in mental health outcomes between different occupations [46]. Civil servants may have greater job security, benefits, and opportunities for career advancement compared to non-permanent employees, which may provide them with a sense of stability and reduce their stress levels [47, 48]. Overall, the findings suggest that it is important to provide practical implications by focusing on family background and working conditions to support the well-being of health workers during times of stress and crisis.

The study has several limitations. First, the design is only cross-sectional; therefore, the causality cannot be assessed. Second, it is limited due to the online survey method and this random sample using self-selecting. The possibility of selection bias cannot be ignored. Despite these limitations, this research contributes to informing on stress, resilience, and depression among healthcare workers during the COVID-19 pandemic. The findings are important to formulate regulations for improving psychological well-being.

CONCLUSIONS

In summary, this study analyzed determinant factors related to stress, resilience, and depression among healthcare workers during the COVID-19 pandemic in Indonesia. It shows that being <30 years, having three children, having three family dependents, and having non-permanent employee status can increase the likelihood of stress in healthcare workers. The number of children has a higher coefficient value than other variables. A direction of future policy is needed to support healthcare workers and their family during times of crisis.

Author contributions: **SS, TAS, FE, & IAS:** validation & writing-review & editing; **SS, TAS, & FE:** conceptualization & supervision; **SS, FE, & IAS:** data curation; **TAS, FE, & IAS:** methodology; & **FE & IAS:** formal analysis & writing original draft. All authors have agreed with the results and conclusions.

Funding: This study was funded by Universitas Borneo Tarakan, Indonesia through "collaborative research" grant number 001/UN51.9/KONTRAK-RK/2022.

Acknowledgements: The authors would like to thank all participants who voluntarily participated in study. The authors would also like to thank Universitas Borneo Tarakan for supporting funding (collaborative research grant). The assistance and guidance were of utmost importance to facilitate this work.

Ethical statement: The authors stated that the study received ethical approval from Health Research Ethics Commission of Faculty of Nursing, Universitas Airlangga (No. 2590-KEPK). Informed consents were given at the beginning before respondents fill out survey. All participation in the study was voluntary, and subject could withdraw their participation at any time.

Declaration of interest: No conflict of interest is declared by authors.

Data sharing statement: Data supporting the findings and conclusions are available upon request from the corresponding author.

REFERENCES

1. WHO. WHO Director-General's opening remarks at the media briefing on COVID-19-11 March 2020. World Health Organization; 2020. Available at: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020> (Accessed: 7 March 2023).
2. Ke R, Sanche S, Romero-Severson E, Hengartner N. Fast spread of COVID-19 in Europe and the US suggests the necessity of early, strong and comprehensive interventions. medRxiv. 2020;2020.04.04.20050427. <https://doi.org/10.1101/2020.04.04.20050427>
3. WHO. WHO coronavirus (COVID-19) dashboard. World Health Organization; 2023. Available at: <https://covid19.who.int/> (Accessed: 7 March 2023).
4. Satgas COVID-19. Data sebaran di Indonesia [Distribution data in Indonesia]. Surabaya; 2022. Available at: <https://covid19.go.id/peta-sebaran> (Accessed: 7 March 2023).
5. Wang C, Pan R, Wan X, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun*. 2020;87:40-8. <https://doi.org/10.1016/j.bbi.2020.04.028> PMID:32298802 PMID:PMc7153528
6. WHO. Mental health and psychosocial considerations during COVID-19 outbreak. World Health Organization; 2020. Available at: <https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf> (Accessed: 7 March 2023).

7. Wang C, Pan R, Wan X, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. 2020;17(5):1729. <https://doi.org/10.3390/ijerph17051729> PMID:32155789 PMCID:PMC7084952
8. Setiawati Y, Wahyuhadi J, Joestandari F, Maramis MM, Atika A. Anxiety and resilience of healthcare workers during COVID-19 pandemic in Indonesia. *J Multidiscip Healthc*. 2021;14:1-8. <https://doi.org/10.2147/JMDH.S276655> PMID:33442258 PMCID:PMC7797347
9. Wu K, Wei X. Analysis of psychological and sleep status and exercise rehabilitation of front-line clinical staff in the fight against COVID-19 in China. *Med Sci Monit Basic Res*. 2020;26:e924085. <https://doi.org/10.12659/MSMBR.924085>
10. Efendi F, Aurizki GE, Auwalin I, McKenna L. The need for speed: A qualitative study on nurse recruitment and management amidst the COVID-19 pandemic in Indonesia. *J Multidiscip Healthc*. 2022;15:1809-17. <https://doi.org/10.2147/JMDH.S370758> PMID:36060420 PMCID:PMC9431772
11. Alharbi H, Alshehry A. Perceived stress and coping strategies among ICU nurses in government tertiary hospitals in Saudi Arabia: A cross-sectional study. *Ann Saudi Med*. 2019;39(1):48-55. <https://doi.org/10.5144/0256-4947.2019.48> PMID:30712051 PMCID:PMC6464677
12. Chatziagianni D, Tsounis A, Markopoulos N, Sarafis P. Occupational stress experienced by nurses working in a Greek regional hospital: A cross-sectional study. *Iran J Nurs Midwifery Res*. 2018;23(6):450-7. https://doi.org/10.4103/ijnmr.IJNMR_120_17 PMID:30386395 PMCID:PMC6178576
13. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun*. 2020;89:531-42. <https://doi.org/10.1016/j.bbi.2020.05.048> PMID:32485289 PMCID:PMC7260522
14. Wahyuhadi J, Efendi F, Al Farabi MJ, et al. Association of stigma with mental health and quality of life among Indonesian COVID-19 survivors. *PLoS One*. 2022;17(2):e0264218. <https://doi.org/10.1371/journal.pone.0264218> PMID:35196326 PMCID:PMC8865694
15. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsis E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: A systematic review and meta-analysis. *Brain Behav Immun*. 2020;88:901-7. <https://doi.org/10.1016/j.bbi.2020.05.026> PMID:32437915 PMCID:PMC7206431
16. Fleming J, Ledogar RJ. Resilience, an evolving concept: A review of literature relevant to aboriginal research. *Pimatisiwin*. 2008;6(2):7-23. PMCID:PMC2956753
17. Ungar M, Theron L. Resilience and mental health: How multisystemic processes contribute to positive outcomes. *Lancet. Psychiatry*. 2020;7(5):441-8. [https://doi.org/10.1016/S2215-0366\(19\)30434-1](https://doi.org/10.1016/S2215-0366(19)30434-1) PMID:31806473
18. Wu AW, Connors C, Everly GS. COVID-19: Peer support and crisis communication strategies to promote institutional resilience. *Ann Intern Med*. 2020;172(12):822-3. <https://doi.org/10.7326/M20-1236> PMID:32251512 PMCID:PMC7146593
19. Sánchez D, Robles M. 14-item resilience scale (RS-14): Psychometric properties of the Spanish version. *Rev Iberoam Diagnostico Eval Psicol*. 2015;40(2):103-13. Available at: <https://www.redalyc.org/pdf/4596/459645432011.pdf>
20. Taylor S, Landry CA, Paluszek MM, Fergus TA, McKay D, Asmundson GJG. Development and initial validation of the COVID-19 stress scales. *J Anxiety Disord*. 2020;72:102232. <https://doi.org/10.1016/j.janxdis.2020.102232> PMID:32408047 PMCID:PMC7198206
21. Arrieta J, Aguerrebere M, Raviola G, et al. Validity and utility of the patient health questionnaire (PHQ)-2 and PHQ-9 for screening and diagnosis of depression in rural Chiapas, Mexico: A cross-sectional study. *J Clin Psychol*. 2017;73(9):1076-90. <https://doi.org/10.1002/jclp.22390> PMID:28195649 PMCID:PMC5573982
22. Spitzer RL, Kroenke K, Williams JBW. Validation and utility of a self-report version of PRIME-MD: The PHQ primary care study. *J Am Med Assoc*. 1999;282(18):1737-44. <https://doi.org/10.1001/jama.282.18.1737> PMID:10568646
23. Kroenke K, Spitzer RL, Williams JBW. The PHQ-9: Validity of a brief depression severity measure. *J Gen Intern Med*. 2001;16(9):606-13. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x> PMID:11556941 PMCID:PMC1495268
24. Manzanares I, Sevilla Guerra S, Lombraña Mencía M, Acar-Denizli N, Miranda Salmerón J, Martínez Estalella G. Impact of the COVID-19 pandemic on stress, resilience and depression in health professionals: A cross-sectional study. *Int Nurs Rev*. 2021;68(4):461-70. <https://doi.org/10.1111/inr.12693> PMID:34097305 PMCID:PMC8242605
25. American Psychological Association. The road to resilience. Washington, DC: American Psychological Association. 2014. Available at: <https://www.apa.org/topics/resilience>
26. Carstensen LL, Turan B, Scheibe S, et al. Emotional experience improves with age: Evidence based on over 10 years of experience sampling. *Psychol Aging*. 2011;26(1):21-33. <https://doi.org/10.1037/a0021285> PMID:20973600 PMCID:PMC3332527
27. Aditya MR, Mansyur M, Mokoagow MI, et al. Stress among healthcare workers during the COVID-19 pandemic and the determinant factors: A cross-sectional study. *Med J Indones*. 2022;31(3):148-54. <https://doi.org/10.13181/mji.oa.226030>
28. Nieto M, Romero D, Ros L, et al. Differences in coping strategies between young and older adults: The role of executive functions. *Int J Aging Hum Dev*. 2020;90(1):28-49. <https://doi.org/10.1177/0091415018822040> PMID:30612437
29. Cristenzeitin LR, Adhi KT. Factors related to work stress among health office employees during COVID-19 pandemic. *Indones J Occup Saf Heal*. 2021;10(3):389. <https://doi.org/10.20473/ijosh.v10i3.2021.389-401>
30. Cakmak G, Ozturk ZA. Being both a parent and a healthcare worker in the pandemic: Who could be exhausted more? *Healthc*. 2021;9(5):564. <https://doi.org/10.3390/healthcare9050564> PMID:34064965 PMCID:PMC8151967
31. Hiraoka D, Tomoda A. Relationship between parenting stress and school closures due to the COVID-19 pandemic. *Psychiatry Clin Neurosci*. 2020;74(9):497-8. <https://doi.org/10.1111/pcn.13088> PMID:32779846 PMCID:PMC7323183
32. Noh JW, Kim KB, Park J, Hong J, Kwon YD. Relationship between the number of family members and stress by gender: Cross-sectional analysis of the fifth Korea National Health and Nutrition Examination Survey. *PLoS One*. 2017;12(9):e0184235. <https://doi.org/10.1371/journal.pone.0184235> PMID:28886136 PMCID:PMC5590891

33. Kandula UR, Wake AD. Magnitude and factors affecting parental stress and effective stress management strategies among family members during COVID-19. *Psychol Res Behav Manag.* 2022;15:83-93. <https://doi.org/10.2147/PRBM.S341299> PMID:35027855 PMCID:PMC8752870
34. Agustina TS, Ismiati Y, Sutinah S. The job satisfaction of non-civil servant nurses in Indonesia public hospitals. *JMMR.* 2020;9(3):223-36. <https://doi.org/10.18196/jmmr.93134>
35. Apriliani E, Hidayah N. Hubungan remunerasi dan motivasi kerja dengan kepuasan kerja perawat di RS PKU Muhammadiyah Gamping [Relationship between remuneration and work motivation with job satisfaction of nurses at PKU Muhammadiyah Gamping Hospital]. *J Ilm Univ Batanghari Jambi.* 2020;20(1):137. <https://doi.org/10.33087/jiubj.v20i1.777>
36. Wirani V, Arso SP, Suryawati C. Analisis perbedaan faktor yang berpengaruh pada kepuasan kerja perawat PNS dan non-PNS di rsud Prof. Dr. Margono Soekarjo Purwokerto [Analysis of the differences in factors that influence the job satisfaction of PNS and non-PNS nurses at Prof. Hospital. Dr. Margono Soekarjo Purwokerto]. *J Kesehat Masy.* 2017;5(4):153-63. <https://doi.org/10.14710/jkm.v5i4.18332>
37. Arslan HN, Karabekiroglu A, Terzi O, Dundar C. The effects of the COVID-19 outbreak on physicians' psychological resilience levels. *Postgrad Med.* 2021;133(2):223-30. <https://doi.org/10.1080/00325481.2021.1874166> PMID:33412973
38. Santarone K, McKenney M, Elkbuli A. Preserving mental health and resilience in frontline healthcare workers during COVID-19. *Am J Emerg Med.* 2020;38(7):1530-1. <https://doi.org/10.1016/j.ajem.2020.04.030> PMID:32336584 PMCID:PMC7156943
39. Ang SY, Uthaman T, Ayre TC, Mordiffi SZ, Ang E, Lopez V. Association between demographics and resilience—A cross-sectional study among nurses in Singapore. *Int Nurs Rev.* 2018;65(3):459-66. <https://doi.org/10.1111/inr.12441> PMID:29517143
40. Mealer M, Jones J, Meek P. Factors affecting resilience and development of posttraumatic stress disorder in critical care nurses. *Am J Crit Care.* 2017;26(3):184-92. <https://doi.org/10.4037/ajcc2017798> PMID:28461539 PMCID:PMC5685839
41. Hoang NA, Van Hoang N, Quach HL, et al. Assessing the mental effects of COVID-19-related work on depression among community health workers in Vietnam. *Hum Resour Health.* 2022;20(1):1-17. <https://doi.org/10.1186/s12960-022-00760-x> PMID:35986294 PMCID:PMC9390118
42. Koinis A, Giannou V, Drantaki V, Angelaina S, Stratou E, Saridi M. The impact of healthcare workers job environment on their mental-emotional health. Coping strategies: The case of a local general hospital. *Health Psychol Res.* 2015;3(1):1984. <https://doi.org/10.4081/hpr.2015.1984> PMID:26973958 PMCID:PMC4768542
43. Li Y, Wang Y, Lv X, et al. Effects of factors related to shift work on depression and anxiety in nurses. *Front Public Health.* 2022;10:926988. <https://doi.org/10.3389/fpubh.2022.926988> PMID:35910870 PMCID:PMC9326492
44. Seixas A, Ferreira T, Silva M V, Rodrigues MA. The impact of shift work on burnout syndrome, depression, anxiety and stress: A case study in the metalworking industry. *Int J Occup Environ Saf.* 2018;2(1):1-8. https://doi.org/10.24840/2184-0954_002.001_0001
45. Fond G, Fernandes S, Lucas G, Greenberg N, Boyer L. Depression in healthcare workers: Results from the nationwide AMADEUS survey. *Int J Nurs Stud.* 2022;135:104328. <https://doi.org/10.1016/j.ijnurstu.2022.104328> PMID:35952535 PMCID:PMC9359895
46. Pala AN, Chuang JC, Chien A, et al. Depression, anxiety, and burnout among hospital workers during the COVID-19 pandemic: A cross-sectional study. *PLoS One.* 2022;17(12):e0276861. <https://doi.org/10.1371/journal.pone.0276861> PMID:36490248 PMCID:PMC9733879
47. Russo C, Terraneo M. Mental well-being among workers: A cross-national analysis of job insecurity impact on the workforce. *Soc Indic Res.* 2020;152(2):421-42. <https://doi.org/10.1007/s11205-020-02441-5>
48. Berdahl TA, Moriya AS. Insurance coverage for non-standard workers: Experiences of temporary workers, freelancers, and part-time workers in the USA, 2010-2017. *J Gen Intern Med.* 2021;36(7):1997. <https://doi.org/10.1007/s11606-021-06700-0> PMID:33772437 PMCID:PMC7997480