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ORIGINAL ARTICLE

What is the COVID-19 Risk Zone Colours Impact: Health Related-Quality of Life of Indonesian Healthcare Workers

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ABSTRACT

Introduction: In Indonesia, over 1000 healthcare workers have died due to COVID-19. Healthcare workers face increased workloads and negative perceptions, including discrimination and verbal or physical violence, which may impact their quality of life. Health-related quality of life encompasses both physical (PCS) and mental (MCS) health components. This study aims to analyze the health-related quality of life of healthcare workers who are obliged to service during the COVID-19 pandemic in Indonesia and occupational health and safety factors based on the workplace location risk zone. **Methods:** A cross-sectional online survey was conducted involving 149 healthcare workers from several areas of Indonesia as representatives from the red and orange risk zones. Health-related quality of life was measured using the SF-36 questionnaire. Differences in health-related quality of life scores were analyzed using Mann-Whitney test base on COVID-19 risk Zone and PPE availability. **Results:** Healthcare workers in the lower-risk (orange zone) exhibited better mental health scores (MCS 75±15.5) compared to those in the high-risk zone (red zone) (MCS 66.2±15.2). Additionally, those who received a complete set of PPE from their workplace had better health-related quality of life scores workplace (MCS 76.9±14.2, PCS 77±16) than those who lacked such provision (MCS 73±17.6, PCS 82±13.4). Furthermore, healthcare workers with access to PCR testing at their workplace tended to have higher quality of life scores than those who only had access to rapid testing. **Conclusion:** These findings highlight how the Health System addresses the pandemic, particularly regarding the health and safety of healthcare workers.

Keywords: COVID-19 risk zone, health-related quality of life, healthcare workers, occupational health and safety, 36-Item short-form health survey (SF-36)

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INTRODUCTION

The COVID-19 pandemic is still the most significant global health problem, spreading and increasing. In early January 2021, the total cases of COVID-19 in the world reached 85 million cases and 2 million death, and within six months, the number of deaths increased by more than 100% or reached 4.2 million deaths (Worldometers, 2021).

Globally, COVID-19 has become the most significant risk and challenge for healthcare workers, who are at high risk for infection. In addition, healthcare workers are also faced with risks that can impact their physical and mental health. WHO reported that more than 80.000 healthcare workers worldwide died due to COVID-19 in the period of Januari 2020 to May 2021 (World Health Organization, 2021). The healthcare workers still required to work during the pandemic have

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an increased workload because they must wear heavy and uncomfortable protective clothing or hazmat. The situation is also enraged by the negative stigma from the people, including verbal and physical violence and discrimination, so the impact of COVID-19 on healthcare workers is not only physical health but also mental health (Okediran *et al.*, 2020; World Health Organization, 2020).

Implementing a colour-coded risk zone in Indonesia to stratify the COVID-19 risk level based on the transmission and infection directly impacts healthcare workers perceived safety and workload (COVID-19 Task Force, 2020a). Healthcare workers are more to five times more likely to be infected to severe COVID-19 than non-essential workers because they are more likely to come into contact with COVID-19 patients, and it could be more severe in the locations included in the higher risk zone (red zone) (Mutambudzi *et al.*, 2021). The availability and appropriate use of Personal Protective Equipment (PPE) are important, as proper PPE reduces the risk of infection and helps to enhance healthcare workers' sense of safety, including reducing fear of contagion. The research from Alzamzami *et al.*, 2025 said that the benefits of using high-quality PPE could promote the well-being of healthcare workers (Dzinamarira *et al.*, 2022; Alzamzami *et al.*, 2025). Furthermore, routine screening facilities for healthcare workers in the workplace play a crucial role in mitigating perceived risk, supporting early detection of infection, including early treatment, and minimizing unnecessary isolation. The screening testing routine contributes to a more stable and supportive work environment for healthcare workers (Black *et al.*, 2020).

Until now, the measurement of health-related quality of life that has been carried out has focused more on high-risk community groups, such as the elderly group, patients with pacemakers, cancer patients, and other patients in emergency conditions. However, without realizing it, during the current COVID-19 pandemic, healthcare workers as front liners are a group at risk of experiencing a decreasing quality of life. Quality of life is defined as an individual's perception of his position. It is assessed through various factors, including physical health, mental well-being, degree of autonomy, quality of social connections, and the surroundings in which they are part. According to WHO, health could be defined as holistic health that leads to a state of well-being in numerous aspects, including physical, mental, and social aspects (Schramme, 2023). So, the measurement of health-related quality of life includes three areas of function: physical, psychological (cognitive and emotional), and social. Good quality of life could increase work productivity so that the target of reaching high-quality service from healthcare workers as the frontliners of COVID-19 could be fulfilled.

Indonesia is the countries with the number of deaths from healthcare workers reaching up to 1631 deaths (Lapor COVID-19, 2021). Several studies in Indonesia on Health Related-Quality of life related to COVID-19 have been conducted but have not found consistent results. Siregar et al's (2022) study concluded that health workers experience depression and anxiety, and the anxiety experienced is related to health quality of life (Siregar *et al.*, 2022). Kotijah and Wahyuni's (2022) study concluded that there was an increase in Psychological disorders, including stress, anxiety, depression, and Post-traumatic stress disorder or PTSD (Kotijah and Wahyuni, 2022). Syamlan et al's (2022) study concluded that health workers experience depression, anxiety, and stress, and health workers were found to have impaired physical and mental components (Syamlan *et al.*, 2022). Hadning and Ainni's (2020) study found that healthcare workers demonstrated strong physical and psychological health, as well as moderate levels of social relations and environmental conditions during COVID-19 pandemic. This research is important to carry out to reduce uncertainty about the truth or validity of findings, contextual variations, different measuring tools and web-based application, and identifying new variables (Hadning and Ainii, 2020). Thus, thus study is essential for evaluating the quality of life of healthcare workers and the factors that are an essential part of the National Health System and to knowing how ready Indonesia is to face the next health challenge.

METHODS

Ethical approval for this study was provided by the Health Research Ethical Committee from the Faculty of Nursing Universitas Airlangga No: 2114-KEPK on October 14, 2020. This study was an analytical observational study with a cross-sectional design. One hundred forty-nine respondents involved in this study are healthcare workers from several regions in Indonesia and representatives from the red and orange risk zones. Informed consent was also provided to the respondents before completing the questionnaire. The sampling method was

a survey using an online platform to implement health protocols during the COVID-19 pandemic in Indonesia. The inclusion criteria were healthcare workers, including medical personnel based on UU Number 17/2023 about Health (Presiden RI, 2023), who were willing to be participants and active during the COVID-19 pandemic. The Indonesian version of the SF-36 questionnaire, specifically for healthcare workers in Infectious environments, has been pre-tested, including reliability and validity tests analysis (Putri *et al.*, 2021). Besides that, to minimize the bias of convenience sampling via an online survey, we provided informed consent to explain the research process, including researchers' contact and confidentiality, as completely as possible.

This study obtained characteristics data, such as demography and socio-economic data of the respondents, using a characteristics questionnaire. The characteristics data are marriage status, educational level, institutional workplace, workplace location, occupation, employment status, Personal Protection Equipment (PPE) Facilities availability, COVID-19 Screening test facilities, length of work, monthly income, and insurance ownership.

Quality of Life Measurement

Health-related quality of life was assessed using the Indonesian version of the SF-36 questionnaire specifically for healthcare workers who work in Infectious environments. Measurement of quality of life using the SF-36 was analyzed by calculating the score per domain, where each question has a score ranging from 0 to 100 based on the answer chosen by the respondent. Quality of life-related to health using the SF-36 questionnaire consists of 8 domains. The domains include Physical Function (PF), Physical Role (RP), Bodily Pain (BP), General Health (GH), Vitality (VT), Social Function (SF), Emotional Role (RE), and Mental Health (MH). These eight domains are further categorized into the Physical Component Score (PCS) and the Mental Component Score (MCS). Physical Component Score (PCS) encompasses physical functioning, physical role, bodily pain, and general health, whereas MCS includes emotional role, vitality, mental health, and social functioning. The way to assess each domain is by calculating the average score from the total score obtained from the questions that representing each domain (RAND, 2020; Andersen *et al.*, 2022; Kimura *et al.*, 2022).

COVID-19 Risk Zone based Risk Zone Mapping

The COVID-19 zone in this study was obtained based on the respondent's workplace location adjusted for the risk zoning map data on the web address https://covid19.go.id/peta-risiko as of December 2020 when this research was conducted, and this risk zone map will constantly be updated regularly. The COVID-19 regional risk zone mapping is calculated using a scoring method based on public health indicators. The parameters include epidemiological factors, public health surveillance metrics, and health service data. These parameters are subsequently scored and classified into four risk categories. In Indonesia, the COVID-19 risk zones are divided into the red zone for high risk, the orange zone for moderate risk, the yellow zone for low risk, and the green zone for areas with no cases or unaffected regions (COVID-19 Task Force, 2020a).

Occupational Health

Data related to occupational health in this study was obtained from questions regarding the availability of complete Personal Protection Equipment (PPE) facilities and COVID-19 screening test facilities from workplaces provided by agencies for health workers. The COVID-19 screening test in Indonesia consists of a PCR test and a rapid test.

Statistical Analysis

Numerical data were represented as median (min-max) for variables with non-normal distributions and as mean ± standard deviation for those with normal distributions. Categorical data were presented in frequencies and percentages. The Mann-Whitney test was applied to analyze the differences in Health-related quality of life scores based on the COVID-19 risk zone and the availability of PPE. Additionally, differences in health-related quality of life scores concerning COVID-19 testing facilities were analyzed using the Kruskal-Wallis test, with the Mann-Whitney test as a post-hoc method. Statistical significance was defined as a p-value <0.05, and the data analysis was carried out using SPSS version 26.

Table 1. Characteristics of Healthcare Workers

	Characteristics	n (%)
Age (years old)		29 (18-55)*
Gender	Male	39 (26.2%)
	Female	110 (73.8%)
Religion	Moslems	136 (91.3%)
	Protestant	9 (6%)
	Catholic	4 (2.7%)
Education	High School	3 (2%)
	Diploma	65 (43.6%)
	Bachelor	37 (24.9%)
	Profession Programme	40 (26.8%)
	Postgraduate	4 (2.7%)
Marital Status	Single	72 (48.3%)
	Married	77 (51.7%)
Profession	General practitioners	19 (12.8%)
	Medical specialist	1 (0.7%)
	Nurse	88 (59.1%)
	Midwife	7 (4.7%)
	Pharmacy	3 (2%)
	Medical Laboratory Technologist	12 (8.0%)
	Nutritionist	3 (2%)
	Radiographer	12 (8.0%)
	Other	4 (2.7%)
Employment Status	Permanent employee/civil servants	62 (41.6%)
	Contract employee	74 (49.7%)
	Volunteer/internship	13 (8.7%)
Work experience	0-10 years	108 (72.5%)
	11-21 years	37 (24.8%)
	22-33 years	4 (2.7%)
Monthly Salary	IDR < 1 million	2 (1.3%)
	IDR 1-2 million	7 (4.7%)
	IDR >2-3 million	15 (10.1%)
	IDR >3-4 million	32 (21.5%)
	IDR > 4-5 million	42 (28.2%)
	IDR > 5 million	51 (34.2%)
Insurance ownership	Health insurance	75 (50.4%)
	Employment Insurance	9 (6%)
	Health and employment insurance	56 (37.6%)
	Don't have	9 (6%)
Workplace	Hospital	65 (43.6%)
	Public health centre	80 (53.7%)
	Health Laboratory	4 (2.7%)
Workplace location	Rural	19 (12.8%)
	Urban	130 (87.2%)

Advanced Table 1. Characteristics of Healthcare Workers

	Characteristics	n (%)
Workplace COVID-19 risk zone	Red	26 (17.4%)
	Orange	123 (82.6%)
PPE Facilities availability	Yes	96 (64.4%)
	Not all PPE is provided	18 (12.1%)
	No Data	35 (23.5%)
COVID-19 Screening test facilities	Yes. Rapid and PCR	86 (57.7%)
	Yes. Rapid	14 (9.4%)
	Yes. PCR	11(7.4%)
	Not provided	3 (2%)
	No Data	35 (23.5%)

*Median (min-max)

RESULT

Characteristics of Healthcare Workers

This study is an online-survey study to measure the health-related quality of life of healthcare workers in Indonesia during the COVID-19 pandemic. The total of healthcare workers involved in this study was 149. The majority of healthcare workers who participated in this study were female (73.8%), education level was diploma (43.6%), working as nurses (59.1%), work experience 0-10 years (72.5%) with the majority monthly salaries reaching more than IDR 5 million (34.2%), have health insurance (50.3%), and working at the public health centre (53.7%) following by work at hospitals (43.6%). The dominant religion was Islam (91.3%), and most participants were married (51.7%). Regarding employment status, almost half were contract employees (49.7%), followed by permanent employees (41.6%). Most healthcare workers were based in urban areas (87.2%). In terms of occupational safety, 64.4% of participants reported the availability of a complete set of PPE in their workplace, while 12.1% stated that not all PPE was provided. For COVID-19 screening facilities, 57.7% had access to both rapid and PCR test, while 9.4% had only rapid testing, and 7.4% had access only to PCR. The majority of participants worked in orange zone areas (82.6%), while 17.4% worked in red zones (Table 1).

Health-related Quality of Life-based on Indonesia's COVID-19 Risk Zone

Measuring the health-related quality of life score based on the COVID-19 zone where health workers work is based on Indonesia's COVID-19 risk zoning map as of December 2020. The health workers' workplace locations in this study are in the orange zone (123 respondents) and red zone (26 respondents) (Table 1). The indication of significant difference (p-value <0.05) is the results from Mann-Whitney test for the emotional role (RE) and mental health (MH) domain, as well as the mental components score. As shown in Table 2, the average health-related quality of life scores across all eight domains for healthcare workers in the red or high-risk zone are lower compared to those of healthcare workers in the orange or moderate-risk zone.

Health-related Quality of Life-based on Occupational health and safety facilities

The scores of health-related quality of life across different domains for healthcare workers in Indonesia based on the availability of PPE facilities and COVID-19 screening tests provided by the workplace are shown in tables 3 and 4. Healthcare workers who receive complete sets of PPE facilities from their workplace tend to have a higher average score across the 8 quality of life domains, including both physical and mental component scores, a comparison was made with healthcare workers who were provided with incomplete PPE by their workplace, so healthcare workers had to provide PPE that was not available independently (Table 3). In addition to PPE, healthcare workers also need routine COVID-19 screening tests for a risk group. The COVID-19 screening test in Indonesia consists of a PCR test and a rapid antibody test. The health-related quality of life score for healthcare workers who receive PCR and rapid COVID-19 screening

test facilities have a higher average quality of life score compared to healthcare workers who only receive rapid test facilities, PCR only, or those who did not receive any screening test facilities at all. The Kruskal-Wallis test results revealed significant differences (p-value <0.05) in the quality of life scores across the General Health (GH), Vitality (VT), Social Functioning (SF), and Mental Health (MH) domains. In contrast, based follow-up tests with Mann Whitney found that differences (p-value <0.05) were found between the group that received the COVID-19 screening test facilities in the form of PCR and Rapid and the group that received the screening test facilities in the form of rapid tests only (Table 4).

DISCUSSION

The high transmission of COVID-19 and increasing cases prevalence have increased the need for the number of healthcare workers. Healthcare workers are known as the front liners heroes because of their role and services that are urgently needed during the COVID-19 pandemic. Based on the COVID-19 risk zone, the respondents involved in this study were the healthcare workers who work

Table 2. Health-related Quality of Life Score based on Indonesia's COVID-19 Risk Zone

	Red Zone (n=26) Mean±SD	Orange Zone (n=123) Mean±SD	p-value
SF-36 Domain Score			
Physical Function (PF)	85.6 ± 14.16	89.14 ±12.10	0.206
Physical Role (RP)	72.1±25.8	74.39±29.06	0.439
Bodily Pain (BP)	80.67±18.75	82.2±18.2	0.641
General Health (GH)	68.10±18.8	73.2±16.3	0.118
Vitality (VT)	62.5±18.9	68.8±18	0.066
Social Function (SF)	71.15±15.7	76.7±19.9	0.056
Emotional Role (RE)	62.8±34.4	77.8±27.5	0.029*
Mental Health (MH)	68.4±15.1	76.7±16.2	0.011*
SF Summary Score			
Physical Components Score (PCS)	76.6±14.7	79.7±14.8	0.243
Mental Components Score (MCS)	66.2±15.2	75±15.5	0.006*

*p-value < 0.05

Table 3. Health-related Quality of Life Score based on IPPE Facilities' Availability

	Yes, Complete set PPE provided (n=96) Mean±SD	Some PPE provided (n=18) Mean±SD	p-value
SF-36 Domain Score			
Physical Function (PF)	90±11.6	88±14	0.692
Physical Role (RP)	78.4±27	72.2±26.9	0.230
Bodily Pain (BP)	83.9±17.2	76.9±21.2	0.141
General Health (GH)	75.8±13.8	71.3±18.5	0.397
Vitality (VT)	70.15±17.2	68.05±19.7	0.740
Social Function (SF)	78.3±17.9	74.3±22.8	0.539
Emotional Role (RE)	81.2±25.96	68.5±33.2	0.114
Mental Health (MH)	78.16±14.2	81.3±15.15	0.406
SF Summary Score			
Physical Components Score (PCS)	82±13.4	77±16	0.155
Mental Components Score (MCS)	76.9±14.2	73±17.6	0.326

in the red zone (high risk) and the orange zone (medium risk).

The current study find that healthcare workers who work in a higher-risk environment (red zone) tend to have a lower quality of life score, including the score of mental health domain (Table 3). This finding aligned with previous studies about the emotional health of healthcare workers during the COVID-19 pandemic. Healthcare workers tend to feel anxious and burnout because of working longer hours, especially in higher-risk workplaces (Jang *et al.*, 2021; Tewani *et al.*, 2022).

The COVID-19 pandemic requires compliance with strict health protocols to prevent COVID-19 transmission. Several things are the responsibility of the workplace where healthcare workers work for provided Personal Protective Equipment (PPE) facilities and COVID-19 test screening facilities for their healthcare workers as front liners when handling COVID-19 cases and as a risk group during the COVID-19 pandemic.

Healthcare workers who did not receive a complete PPE set from their workplace institution generally reported lower average health-related quality of life scores compared to those who were provided with a full PPE set. Referring to the guidelines for PPE usage by healthcare workers during the COVID-19 pandemic in Indonesia (Mitigation Team of Indonesian Physicians Association, 2020), the type of PPE that must be provided at each level does not only consist of 1 type of PPE but several PPE to protect all parts of the body from the risk of COVID-19 infection. The level of PPE is divided into 3 level based on the type of procedure and location of service the healthcare worker is assigned to. PPE level 1 is intended for healthcare workers and their supporters who provide triage services, unrelated COVID-19 outpatient and inpatient services, general medical practice, and procedures that do not generate aerosols, while PPE level 3 is for the highest protection (COVID-19 Task Force, 2020b; Mitigation Team of Indonesian Physicians Association, 2020).

The availability and use of Personal Protective Equipment (PPE) for healthcare are crucial for various reasons, one of the key factors protection of healthcare workers from COVID-19. PPE is a protective barrier that protects healthcare workers from interacting directly with COVID-19 and other pathogenic viruses. PPE also helps healthcare workers feel safe while working and can support their activities to give optimal care to patients (Elgibaly *et al.*, 2021; UNICEF, 2021).

The feeling of being safe and protected while using a complete set of PPE is a factor that can affect the quality of life of healthcare workers better than healthcare workers who use an incomplete set of PPE. The feeling of safety and being protected can

Table 4. Health-related Quality of Life Score based on COVID-19 Screening test facilities

	Yes, Rapid and PCR (n=86) Mean±SD	Yes, Rapid (n=14) Mean±SD	Yes, PCR (n=11) Mean±SD	Not provided (n=3) Mean±SD	p-value
SF-36 Domain Score					
Physical Function (PF)	90.4±11.4	88.21±12.8	86.8±13.5	86.6±23	0.725
Physical Role (RP)	78.2±26.23	71.4±30.8	79.5±26.9	75±43.3	0.845
Bodily Pain (BP)	84.4±15.6	74.3v22.8	80.9±26.1	82.5±22.2	0.419
General Health (GH)	76.6±13.9†	63.9±18.2†	76.9±12.4	75±4.1	0.038*
Vitality (VT)	71.5±17.3†	57.14±17.4†	72.3±11.7	71.6±28.4	0.024*
Social Function (SF)	80.23±17.6†	64.3±20.7†	76.1±19.7	75±21.6	0.039*
Emotional Role (RE)	80.23±25.7	78.6±33.6	72.7±32.7	77.8±38.5	0.893
Mental Health (MH)	79.9±14.1†	69.4±13.2†	79.6±14.1	82.6±16.2	0.045*
SF Summary Score					
Physical Components Score (PCS)	82.4±12.8	74.5±16.6	81.04v17.6	79.8±16.6	0.309
Mental Components Score (MCS)	77.9±14.1	67.3±16.5	75.2±12	76.7±24.12	0.059

*p-value < 0,05, Statistical analysis using Kruskall Wallis

†p-value<0,05, Follow-up test using Mann Whitney compared to Yes, Rapid, and PCR group

at least influence a healthcare worker's physical and mental health while carrying out their duties. The increasing price and the rareness of PPE cause not all healthcare workers to meet their needs to use PPE appropriately. Healthcare workers must use some PPE repeatedly, including self-produced hazmat for healthcare workers by healthcare institutions at the start of the COVID-19 pandemic in Indonesia (Shrivastava and Shrivastava, 2020; Prajogo *et al.*, 2021). To prepare for the pandemic, various enhancements should be implemented to guarantee sufficient supplies of critical items for healthcare systems, including PPE. Governments and health systems should proactively plan for access to essential supplies like PPE to meet rising demands and ensure distribution to the most burdened areas (Williams *et al.*, 2023).

The healthcare service in Indonesia has its policies regarding the facilities and infrastructure provided for healthcare workers. Some healthcare services are unwilling to provide COVID-19 screening test facilities for their healthcare workers. However, healthcare services are also willing to provide COVID-19 screening test facilities for their healthcare workers. Based on the results of this study, it is known that the quality of life scores of healthcare workers who receive COVID-19 test facilities, either PCR or PCR along with rapid, have higher scores compared to healthcare workers who only receive rapid test facilities or healthcare workers who do not receive screening test facilities at all (Table 4). The COVID-19 screening tests, including effective testing like PCR for healthcare workers who have symptoms or are asymptomatic, are carried out to protect fellow healthcare workers, patients, visitors, and the families of healthcare workers (Black *et al.*, 2020; Rivett *et al.*, 2020). So that healthcare workers can carry out their duties safely without worrying about the risk of transmitting COVID-19 to people who have to interact with them. Lessons from Quebec, Canada, state that it is not only in the COVID-19 or the pandemic era, the promoting of health and well-being of healthcare workers needs in all contexts including in routine practices (Alami *et al.*, 2021).

During the COVID-19 pandemic, type A and B hospitals or referral hospitals have a working system for their healthcare workers, especially nurses, which is a work shift system for two weeks of work followed by two weeks of holiday to anticipate healthcare workers being exposed to the risk of COVID-19, after completing a 2-week work shift they will be given facilities COVID-19 screening test (Shrivastava and Shrivastava, 2020). In contrast, type C hospitals, or non-referral hospitals, will operate under the standard work system, with rapid tests typically provided when necessary for the healthcare workers at the hospital. There are also healthcare services that provide free COVID-19 screening tests (PCR tests) for their health workers with a high risk of infection, but not all healthcare services can provide this facility, so their healthcare workers still need to pay. This condition is partly because, during the pandemic, non-COVID-19 patients feel afraid to visit healthcare services, including hospitals, so it can cause a decrease in hospital income and impact the ability of hospitals or healthcare services to provide a complete set of safe and comfortable PPE as well as a free COVID-19 test for their healthcare workers (Prajogo *et al.*, 2021).

COVID-19 screening tests for health workers consist of rapid antibody/antigen tests and/or Polymerase Chain Reaction (PCR) tests or swab tests. In the early days of the COVID-19 pandemic, the rapid antibody test with venous or capillary blood samples was still one of the choices for the COVID-19 screening test, although now it is no longer recommended as a COVID-19 screening test, the rapid antibody test is a test with the principle of detecting the presence of antibodies in the blood after being infected with a virus that causes disease or even antibodies after a vaccine. Rapid antibody tests cannot detect COVID-19 infection quickly because it takes 1 to 3 weeks for antibodies to form after infection. In addition, rapid antibody tests can also be detected as positive due to past infection with COVID-19 (Center for Disease Control and Prevention, 2021). The test recommended by WHO is the Polymerase Chain Reaction (PCR) test. This test serves not only as a screening and diagnostic tool for COVID-19 infection but also as a follow-up measure to track the progression of the virus within the body. However, this test is pretty expensive compared to rapid tests. Rapid antigen test is one of the tests that can be used and is said to be more affordable than PCR. Even though rapid antigen has a lower level of sensitivity than PCR and still has other drawbacks, this test is more recommended as a screening test than rapid antibody tests (Ulinici *et al.*, 2021; Government of Ontario, 2024). The results of the post-hoc test using Mann-Whitney found that there were differences in the health-related quality of life scores for the General Health (GH), Vitality (VT), Social Functioning (SF), and Mental Health

(MH) domains (p-value <0.05) between healthcare workers who were provided with both PCR and rapid screening tests, compared to those who only received rapid tests (Table 4). The General Health (GH) domain is a domain to measure how a person perceives their health in general, then the Vitality (VT) domain measures energy levels, the SF domain measures the effect of health on a person's social abilities and the MH domain measures mental health (Putri *et al.*, 2021). For the healthcare workers who receive a screening test facility in the form of a rapid test and are also supported by PCR which has a high sensitivity capability, it is hoped that healthcare workers will have a better perception of general health as well as a better energy level than healthcare workers who only receive rapid test facilities. In addition, healthcare workers who have received PCR and rapid test screening facilities will experience lower anxiety in carrying out their duties and can still interact while adhering to health protocols compared to healthcare workers who only get rapid test facilities.

This study involved a relatively low sample number because it is relatively complex to get the willingness of healthcare workers to fill out the online form when COVID-19 is at its peak. However, this study could provide a complete set of data regarding the characteristics and occupational health and safety of healthcare workers related factors. Besides that, quality of life measurements is rarely used by healthy populations like healthcare workers. So from this study, we could measure the quality of life for the healthy population and hope this study's results could be used as input to prepare Indonesia to face the next health challenge.

Identifying differences in health-related quality of life (HRQoL) among healthcare workers in various COVID-19 risk zones provides valuable insights for policymakers and healthcare administrators. This information can aid in developing tailored interventions and support programs that address the specific needs of healthcare workers based on their exposure risk. Strengthening workplace support and resources by recognizing key occupational factors is essential to safeguard healthcare workers from COVID-19 exposure risks. Additionally, a deeper understanding of healthcare workers' mental health components can raise awareness about the psychological effects of the pandemic and inform the implementation of mental health services, counselling, and stress management initiatives.

CONCLUSION

The health-related quality of life score tends to be higher in healthcare workers working in the medium-risk zone than in the red zone. Furthermore, higher health-related quality of life scores were also obtained from the healthcare workers who got all the safety facilities (complete set PPE), including regular complete test screening facilities (Rapid and PCR) from their workplaces. These findings describe how the Health System in Indonesia deals with the pandemic, especially regarding the health and safety of healthcare workers. Healthcare workers, as the front liners, especially during the pandemic, should receive more deals regarding their health and safety while carrying out their duties. Despite working in high-risk conditions, healthcare workers must continue providing their services. Therefore, based on the latest health regulation and healthcare system, the the top-down implementation must ensure that all healthcare workers feel secure and empowered to tackle new and emerging threats.

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CONFLICT OF INTEREST

All authors-none to declare

AUTHORS CONTRIBUTOR

NSH and BDP conceived the study idea while BDP planned the study design. NSH took the lead in data analysis, manuscript writing, reviewing, and editing. BDP assisted with writing, reviewing, and editing the manuscript. IMR oversaw the review and finalization of the manuscript. All authors contributed to the review and approval of the final manuscript version.

REFERENCES

Alami, H. *et al.* (2021) 'How Can Health Systems Better Prepare for the Next Pandemic? Lessons

Learned From the Management of COVID-19 in Quebec (Canada)', *Frontiers in Public Health*, 9(June), p. 671833. doi: 10.3389/fpubh.2021.671833.

Alzamzami, A. A. *et al.* (2025) 'Personal Protective Equipment Usage and Compliance among Healthcare Workers', *International Journal of Community Medicine and Public Health*, 12(2), pp. 1–5. doi: https://dx.doi.org/10.18203/2394-6040.ijcmph20250043.

Andersen, J. R. *et al.* (2022) 'Correlated physical and mental health composite scores for the RAND-36 and RAND-12 health surveys: can we keep them simple?', Health and Quality of Life Outcomes. *BioMed Central*, 20(1), pp. 1–8. doi: 10.1186/s12955-022-01992-0.

Black, J. R. M. *et al.* (2020) 'COVID-19: the case for health-care worker screening to prevent hospital transmission', *The Lancet*, 395(10234), pp. 1418–1420. doi: 10.1016/S0140-6736(20)30917-X.

Center for Disease Control and Prevention (2021) Using antibody tests, cdc.gov. Available at: https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests.html (Accessed: 2 October 2021).

COVID-19 Task Force (2020a) COVID-19 Risk Zone Mapping, covid19.go.id. Available at: https://covid19.go.id/peta-risiko (Accessed: 22 December 2021).

COVID-19 Task Force (2020b) Personal Protective Equipment (PPE) standards for handling COVID-19 in Indonesia, Standar Alat Pelindung Diri (APD) Untuk Penanganan Covid-19 di Indonesia.

Dzinamarira, T. *et al.* (2022) 'Risk Factors for COVID-19 Infection Among Healthcare Workers. A First Report From a Living Systematic Review and meta-Analysis', *Safety and Health at Work*, pp. 263–268. doi: 10.1016/j.shaw.2022.04.001.

Elgibaly, O. *et al.* (2021) 'Knowledge, perception, and confidence of healthcare workers about COVID-19 preventive measures during the first wave of the pandemic: A cross-sectional study from Egypt', *Germs*, 11(2), pp. 179–188. doi: 10.18683/germs.2021.1255.

Government of Ontario (2024) COVID - 19 testing and treatment. Available at: https://www.ontario.ca/page/covid-19-testing-and-treatment (Accessed: 21 July 2024).

Hadning, I. and Ainii, N. Q. (2020) 'An Analysis of Health Workers' Quality of Life in Indonesia During COVID-19 Pandemic', *Proceedings of the 4th International Conference on Sustainable Innovation 2020–Health Science and Nursing (ICoSIHSN 2020)*, 33(ICoSIHSN 2020), pp. 425–430. doi: 10.2991/ahsr.k.210115.085.

Jang, Y. *et al.* (2021) 'Burnout and peritraumatic distress of healthcare workers in the COVID-19 pandemic', *BMC Public Health*, 21(1), pp. 1–9. doi: 10.1186/s12889-021-11978-0.

Kimura, M. *et al.* (2022) 'Health-Related Quality of Life Evaluation Using the Short Form-36 in Patients With Human T-Lymphotropic Virus Type 1-Associated Myelopathy', *Frontiers in Medicine*, 9(April), pp. 1–11. doi: 10.3389/fmed.2022.879379.

Kotijah, S. and Wahyuni, L. (2022) 'Mental Health and Quality of Life for Health Workers During the COVID-19 Pandemic: A Systematic Review', *Psychiatry Nursing Journal (Jurnal Keperawatan Jiwa)*, 4(1), pp. 11–28. doi: 10.20473/pnj.v4i1.33569.

Lapor COVID-19 (2021) Mortality prevalence of healthcare workers against COVID-19, nakes.laporcovid19.org. Available at: https://nakes.laporcovid19.org/statistik (Accessed: 29 July 2021).

Mitigation Team of Indonesian Physicians Association (2020) Guidelines standards for Doctor Protection in the Era of COVID-19, Indonesian Physicians Association. *Edited by V. H. Putri*. Jakarta: Indonesian Physicians Association.

Mutambudzi, M. *et al.* (2021) 'Occupation and risk of severe COVID-19: Prospective cohort study of 120 075 UK Biobank participants', *Occupational and Environmental Medicine*, 78(5), pp. 307–314. doi: 10.1136/oemed-2020-106731.

Okediran, J. O. *et al.* (2020) 'The experiences of healthcare workers during the covid-19 crisis in lagos, nigeria: A qualitative study', *Germs*, 10(4), pp. 356–366. doi: 10.18683/germs.2020.1228.

Prajogo, D. *et al.* (2021) Occupational Health and Safety (OHS): Protecting the Indonesian Healthcare Workforce during the COVID-19 Pandemic.

Presiden RI (2023) 'Undang-Undang Republik Indonesia Nomor 17 Tahun 2023 Tentang Kesehatan', Undang-Undang, (187315), pp. 1–300.

Putri, B. D. *et al.* (2021) 'The Indonesian Version of SF-36 Questionnaire: Validity and Reliability Testing in Indonesian Healthcare Workers Who Handle Infectious Diseases', *Indian Journal of Forensic Medicine & Toxicology*, 15(2), pp. 2114–2121. doi: 10.37506/ijfmt.v15i2.14677.

RAND (2020) 36-Item Short Form Survey (SF-36) Scoring Instructions, rand.org. Available at: https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form/scoring.html (Accessed: 22 December 2020).

Rivett, L. *et al.* (2020) 'Screening of healthcare workers for SARS-CoV-2 highlights the role of asymptomatic carriage in COVID-19 transmission', *eLife*, 9, pp. 1–20. doi: 10.7554/eLife.58728.

Schramme, T. (2023) 'Health as Complete Well-Being: The WHO Definition and Beyond', *Public Health Ethics*, 16(3), pp. 210–218. doi: 10.1093/phe/phad017.

Shrivastava, S. R. and Shrivastava, P. S. (2020) 'Standardized risk assessment and management of exposure amongst healthcare workers to coronavirus disease 2019', *Germs*, 10(2), pp. 126–128. doi: 10.18683/germs.2020.1196.

Siregar, D. *et al.* (2022) 'Quality of Life among Indonesian during the COVID-19 Pandemic', *Macedonian Journal of Medical Sciences*, 10(E), pp. 1788–1792. doi: 10.3889/oamjms.2022.10607.

Syamlan, A. T. *et al.* (2022) 'Mental health and health-related quality of life among healthcare workers in Indonesia during the COVID-19 pandemic: A cross-sectional study', *BMJ Open*, 12(4), pp. 1–10. doi: 10.1136/bmjopen-2021-057963.

Tewani, K. *et al.* (2022) 'Anxiety and burnout among healthcare workers during the COVID-19 circuit breaker in a Women's and Children's Hospital in Singapore', *Germs*, 12(1), pp. 137–141. doi: 10.18683/germs.2022.1317.

Ulinici, M. *et al.* (2021) 'Screening, diagnostic and prognostic tests for COVID-19: A comprehensive review', *Life*, 11(6), pp. 1–14. doi: 10.3390/life11060561.

UNICEF (2021) Three reasons why personal protective equipment (PPE) supply remains critical, unicef.org.

Williams, B. A. *et al.* (2023) 'Outlook of pandemic preparedness in a post-COVID-19 world', *npj Vaccines*, 8(1). doi: 10.1038/s41541-023-00773-0.

World Health Organization (2020) Protecting health workers from COVID-19, World Health Organization. Available at: https://www.who.int/westernpacific/news-room/feature-stories/item/protecting-health-workers-from-covid-19 (Accessed: 15 July 2021).

World Health Organization (2021) Health and Care Worker Deaths during COVID-19, World Health Organization. Available at: https://www.who.int/news/item/20-10-2021-health-and-care-worker-deaths-during-covid-19 (Accessed: 19 July 2025).

Worldometers (2021) COVID-19 Corona Virus Pandemic, worldometers.info. Available at: https://www.worldometers.info/coronavirus/ (Accessed: 29 July 2021).