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ORIGINAL ARTICLE

FACTORS ASSOCIATED WITH WORK STRESS AMONG NURSES AT COMMUNITY HEALTH CENTERS

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ABSTRACT

Work stress is a common occupational health issue among nurses. Approximately 50.9% of nurses in Indonesia have been reported to experience work-related stress. Work stress may adversely affect nurses' concentration and performance, potentially compromising the consistent implementation of infection prevention and control practices. This study aimed to identify factors associated with work stress among nurses working at community health centers in Purbalingga Regency. A cross-sectional study was conducted involving 169 nurses from 22 community health centers. Data were collected using questionnaires assessing age, sex, educational level, marital status, length of employment, workload, interpersonal relationships, work environment, knowledge, and work stress. Data were analyzed using univariate analysis, the chi-square test for bivariate analysis, and multivariable logistic regression. Overall, 84 nurses (49.7%) experienced work stress. Workload was significantly associated with work stress in both bivariate and multivariable analyses, whereas no significant associations were found for the other variables ($p > 0.05$). These findings indicate that workload is an important factor associated with work stress among community health center nurses. Effective workload management may help support nurses' performance and promote working conditions that facilitate the consistent implementation of infection prevention and control practices.

Keywords: *Community health centers; nurses; work stress*

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BACKGROUND

Work stress is one of the major occupational health issues in the nursing profession. Nurses face high job demands because they interact directly with patients, are responsible for patient safety, and work in dynamic healthcare environments. A study of nurses in Australia found that 41.2% of the participants experienced symptoms of stress, indicating that stress in the nursing profession warrants serious attention (Maharaj et al., 2019). Similarly, a national survey reported that approximately 50.9% of nurses had experienced work-related stress (Sofyan et al., 2022).

Work stress among nurses is associated with various factors related to both individual characteristics and working conditions. An integrative review of 132 studies found that factors contributing to nurses' work stress could be grouped into sociodemographic factors, work environment factors, and personal resources. The effects of work stress may manifest in health status, work ability, work-related responses, and organizational performance (Okuhara et al., 2021). Based on this framework, age, sex, educational level, marital status, length of employment, workload, interpersonal relationships, work environment, and knowledge are relevant factors to examine in relation to nurses' occupational stress.

Workload is an important occupational factor in nursing services. A review of primary healthcare nurses indicated that high workloads can affect nurses' health and contribute to professional fatigue, with potential implications for patient safety and quality of care (Pérez-Francisco et al., 2020). This

issue is particularly relevant to community health center nurses, who are responsible not only for providing direct care to individuals but also for delivering family-, group-, and community-based services and implementing various health programs within their service areas.

Poorly managed work stress can affect nurses' ability to provide optimal care. Previous studies have shown that work stress is associated with reduce quality of life and caring behavior among nurses. Furthermore, poor psychological well-being may hinder professional performance and compromise the quality of care provided to patients (Babapour et al., 2022; Maharaj et al., 2019). Therefore, work stress is not only an occupational health concern but also warrants attention because of its potential implications for the quality and safety of healthcare services.

One important aspect of nurses' performance in ensuring healthcare safety is the implementation of infection prevention and control (IPC) practices. Nurses are directly involved in various care activities that require consistent adherence to hand hygiene, the use of personal protective equipment, and other infection prevention procedures. Research has suggested that work-related psychological distress may have implications for safety practices. For example, burnout among nursing staff has been associated with lower compliance with hand hygiene, a key component of preventing healthcare-associated infections (Manomenidis et al., 2019). Accordingly, the relevance of work stress to IPC in this study is considered in terms of its potential implications for nurses' performance, rather than as a direct causal relationship with the occurrence of healthcare-associated infections.

The occupational characteristics of community health center nurses differ from those of hospital nurses. In addition to providing direct patient care, nurses at community health centers may be involved in outpatient services, inpatient care at centers with inpatient facilities, family- and community-based services, and various public health programs. The diversity of these responsibilities may increase job demands, making it important to identify factors associated with work stress in primary healthcare settings. Previous evidence has also highlighted the importance of considering workload to protect nurses' health while maintaining patient safety and service quality (Pérez-Francisco et al., 2020).

A preliminary study conducted in Purbalingga Regency found that, among 30 nurses interviewed, 5 (16.66%) experienced severe stress, 17 (56.67%) experienced moderate stress, and 8 (26.67%) experienced mild stress. Some nurses who experienced stress also reported fatigue, unfinished tasks, slower work performance, and occasional lapses in remembering to use personal protective equipment. These preliminary findings suggest that work stress warrants attention because it may affect nurses' ability to perform their duties optimally, including consistently implementing infection prevention and control measures.

Although research on work stress among nurses has been conducted extensively in hospital settings, evidence regarding factors associated with work stress among primary healthcare nurses, particularly in Purbalingga Regency, remains limited. The diverse responsibilities of nurses at community health centers, which include providing services to individuals, families, groups, and communities, create a distinct occupational context that merits further investigation. Therefore, this study aims to identify factors associated with work stress among nurses at community health centers in Purbalingga Regency. The findings are expected to provide a basis for supporting workload management, improving nurses' performance, and promoting the consistent implementation of IPC practices.

METHOD

Research design

This study employed a quantitative analytic design with a cross-sectional approach. This design was used to analyze the relationship between individual characteristics and work-related factors and work stress among Puskesmas nurses in Purbalingga Regency at a single point in time. Prior to data collection, administrative preparations and coordination with 22 Public Health Centers (Puskesmas) in Purbalingga Regency were conducted from July to September 2024. Following ethical approval on November 26, 2024, data collection commenced on November 27, 2024, through a survey of nurses working at these health centers. The independent variables included age, sex, educational level, marital status, length of employment, workload, interpersonal relationships, work environment, and knowledge, while the dependent variable was work stress.

Sample

The study population comprised 280 nurses working at inpatient and non-inpatient puskesmas across 22 puskesmas in Purbalingga Regency. A total sampling approach was applied by inviting all nurses in the study population to participate. Of the 280 nurses invited, 169 agreed to participate and completed all data collection procedures. Therefore, the final sample included 169 nurses.

Participation was voluntary. Nurses who agreed to participate provided informed consent and completed the research instruments. Those who declined to participate or did not complete the instruments were not included in the final analysis.

Instruments

The study used questionnaire and physical measurement instruments to collect data on respondents' characteristics and the study variables. The questionnaire covered age, sex, educational level, marital status, length of employment, workload, interpersonal relationships, knowledge, perceptions of work environment comfort, and work stress. Questionnaire responses were collected online using Google Forms.

The physical work environment was assessed by measuring room air temperature using a thermometer and lighting intensity using a lux meter. A digital camera was also used to document the study procedures. In addition to these physical measurements, respondents' perceptions of work environment comfort were assessed using a questionnaire.

Data collection

Before the main data collection, the questionnaire underwent validity and reliability testing to assess its measurement properties. Following this process, the main survey was conducted among nurses working at puskesmas in Purbalingga Regency. The questionnaire was distributed online through Google Forms to collect data on respondents' characteristics and the study variables, including age, sex, educational level, marital status, length of employment, workload, interpersonal relationships, knowledge, perceptions of work environment comfort, and work stress. Physical measurements of room air temperature and lighting intensity were also conducted using a thermometer and a lux meter, respectively.

Validity and reliability of the questionnaire
The validity and reliability testing of the questionnaire were assessed before the main data collection using responses from 30 nurses with characteristics similar to those of the study population. Item validity was valuated using the Pearson product-moment correlation. An item was considered valid if its calculated correlation coefficient (r) exceeded the critical r value. For the 30 participants, the critical r value was 0.361. The results indicated that all items met the validity criteria.

Internal consistency was assessed using Cronbach's alpha. The resulting coefficients were 0.71 for the workload questionnaire, 0.73 for interpersonal relationships, 0.83 for knowledge, 0.78 for perceptions of the work environment, and 0.77 for work stress. These values indicated adequate internal consistency for the instruments.

Data analysis
Data were analyzed using univariate, bivariate, and multivariate analyses. Univariate analysis was used to describe the frequency distribution and proportions of the study variable, including respondents' characteristics, workload, interpersonal relationships, perceptions of the work environment, knowledge, and work stress.

Bivariate analysis was conducted using the chi-square test to examine the associations between each independent variable and work stress. Variables meeting the criteria for inclusion in the multivariate analysis were subsequently entered into a multiple logistic regression model to identify factors associated with work stress after accounting for other variables in the model. Statistical significance was set at $p < 0.05$.

Ethical considerations
This study received ethical approval from the Research Ethics Committee of the Faculty of Health Sciences, Universitas Jenderal Soedirman, under approval number 1711/EC/KEPK/XI/2024. The study was conducted in accordance with research ethics principles, with due consideration for respondents' rights and confidentiality. Participation was voluntary, and respondents were informed about the study's purpose and procedures before providing informed consent. The collected data were used solely for research purposes and presented in aggregate form to protect respondents' identities.

RESULT

Table 1. Characteristics of Nurses Working at Community Health Centers in Purbalingga Regency

Characteristics	n	%
Age		
≥ 31 years	152	89.9
< 31 years	17	10.1
Gender		
Male	69	40.8
Female	100	59.2
Educational level		
Diploma	117	69.2
Bachelor's degree	10	5.9
Professional Nurse (Ners)	42	24.9
Marital status		
Married	159	94.1
Unmarried	10	5.9
Length of employment		
≤ 2 years	30	17.8
> 2 years	139	82.2
Workload		
Moderately heavy	23	13.6
Heavy	124	73.4
Very heavy	22	13.0
Interpersonal relationships		
Fairly good	7	4.1
Good	146	86.4
Very good	16	9.5
Work environment		
Fairly comfortable	27	16.0
Comfortable	128	75.7
Very comfortable	14	8.3
Knowledge		
Fairly good	2	1.2
Good	81	47.9
Very good	86	50.9

Source: Primary Data 2024

Table 1 presents the characteristics of nurses working at puskesmas in Purbalingga Regency. Of the 169 respondents, the majority were aged ≥31 years (89.9%) and female (59.2%). Most respondents had a diploma-level education (69.2%), while 24.9% had completed the Professional Nurse (Ners) program. Regarding marital status, most respondents were married (94.1%). In addition, the majority had more than two years of work experience (82.2%).

Regarding occupational characteristics, most respondents reported a heavy workload (73.4%), while 13.6% and 13.0% reported moderately heavy and very heavy workloads, respectively. Most respondents perceived their interpersonal relationships at work as good (86.4%) and their work environment as comfortable (75.7%). More than half had a very good level of knowledge (50.9%), followed by those with a good level of knowledge (47.9%). Only a small proportion reported fairly good interpersonal relationships (4.1%) and a fairly comfortable work environment (16.0%).

Table 2. Bivariate Analysis of Factors Associated with Work Stress Among Nurses at Community Health Centers in Purbalingga Regency

Variables	Categories	Not stressed n	%	Stressed n	%	Total n	*p*-value
Age	≥ 31 years	77	50.7	75	49.3	152	0.778
	< 31 years	8	47.1	9	52.9	17	
Sex	Male	37	53.6	32	46.4	69	0.472
	Female	48	48.0	52	52.0	100	
Educational level	Diploma	61	52.1	56	47.9	117	0.262
	Bachelor's degree	7	70.0	3	30	10	
	Professional Nurse (Ners)	17	40.5	25	59.5	42	
Marital status	Unmarried	4	40.0	6	60	10	0.501

Variables	Categories	Not stressed n	%	Stressed n	%	Total n	*p*-value
	Married	81	50.9	78	49.1	159	
Length of employment	≤ 2 years	16	53.3	14	46.7	30	0.714
	> 2 years	69	49.6	70	50.4	139	
Workload	Moderately heavy	17	73.9	6	26.1	23	0.006
	Heavy	62	50.0	62	50.0	124	
	Very heavy	6	27.3	16	72.7	22	
Interpersonal relationships	Fairly good	3	42.9	4	57.1	7	0.824
	Good	73	50.0	73	50	146	
	Very good	9	56.3	7	43.8	16	
Perceived work environment	Fairly comfortable	10	37.0	17	63.0	27	0.302
	Comfortable	67	52.3	61	47.7	128	
	Very comfortable	8	57.1	6	42.9	14	
Knowledge	Fairly good	0	0.0	2	100.0	2	0.103
	Good	37	45.7	44	54.3	81	
	Very good	48	55.8	38	44.2	86	
Total		85	50.3	84	49.7	169	

Source: Primary Data 2024

Table 3. Unadjusted Binary Logistic Regression Analysis of the Association Between Workload and Work Stress Among Nurses at Community Health Centers in Purbalingga Regency

Workload	B	SE	Wald	COR	95% CI	p-value
Moderately heavy (Ref.)	–	–	–	1.00	–	–
Heavy	1.041	0.508	4.208	2.83	1.05–7.66	0.040
Very heavy	2.022	0.674	8.995	7.56	2.02–28.33	0.003

Note: COR = Crude Odds Ratio; CI = Confidence Interval; Ref. = Reference category. Estimates are unadjusted.

The bivariate analysis showed that workload was the only variable significantly associated with work stress (p = 0.006). The proportion of nurses experiencing work stress increased across workload categories, from 26.1% among those with moderately heavy workload to 50.0% among those with heavy workloads, and 72.7% among those with very heavy workloads.

Work stress was not statistically associated with age (p = 0.778), sex (p = 0.472), educational level (p = 0.262), marital status (p = 0.501), length of employment (p = 0.714), interpersonal relationships (p = 0.824), perceptions of the work environment (p = 0.302), or knowledge (p = 0.103).

Workload and knowledge met the preliminary screening criterion for multivariable analysis, with bivariate p-values below 0.25. The unadjusted binary logistic regression analysis showed that workload was significantly associated with work stress. Compared with nurses reporting moderately heavy workloads, those reporting heavy workloads had 2.83 times higher odds of experiencing work stress (COR = 2.83; 95% CI: 1.05–7.66; p = 0.040). Similarly, nurses reporting very heavy workloads had 7.56 times higher odds of experiencing work stress (COR = 7.56; 95% CI: 2.02–28.33; p = 0.003). These findings suggest that higher workload categories were associated with greater odds of work stress. However, these estimates were not adjusted for potential confounding variables.

DISCUSSION

The findings showed that work stress was prevalent among nurses working at community health centers (puskesmas) in Purbalingga Regency. This indicates that work stress is a relevant occupational health concern among primary healthcare nurses. Puskesmas nurses have diverse responsibilities, including providing direct patient care, delivering family- and community-based services, and implementing various health programs within their service areas. Muhamad Robat et al. (2021) showed that sources of stress differ across healthcare settings. Although hospital nurses had higher job stressor scores than non-hospital nurses, stress was present in both groups. This suggests that primary healthcare settings also have specific occupational stressors that need to be understood in relation to their actual job demands rather than solely to the type of healthcare facility.

The most notable finding in this study was the significant association between workload and work stress. The findings showed that nurses with heavier workloads were more likely to experience work stress. This pattern is consistent with international evidence on the consequences of high nursing workloads. Roetje et al. (2020), in an integrative review of reviews, identified work overload as one of the major job demands among nursing personnel. Shin et al. (2018), through a meta-analysis, also found that higher patient-to-nurse ratios were associated with increased burnout, job dissatisfaction, and intention to leave. In low- and middle-income countries, Assaye et al. (2021) reported that high nursing workloads were associated with burnout, absenteeism, work-related injuries, and the desire to leave the job. These findings suggest that the relationship observed in Purbalingga is consistent with broader evidence identifying workload as an important organizational factor affecting nurses' well-being. Siregar et al. (2020), in a qualitative study of hospital nurses, described work stress in relation to work demands and limited nursing resources and highlighted nurses' expectations for managerial support. Although their study was conducted in a hospital, it reinforces the relevance of organizational conditions when interpreting workload-related stress in primary healthcare settings.

However, the workload of puskesmas nurses cannot be understood solely in terms of patient-to-nurse ratios. Primary

healthcare nurses may simultaneously be responsible for in-facility services, outreach activities, administrative tasks, family- and community-based care, and various health programs. Kaihlanen et al. (2023), in a study among community-based nurses, showed that stress was associated not only with the volume of direct care but also with time pressure, work interruptions, role conflict, and disruptions during the workday. These findings help explain how the accumulation of different responsibilities may contribute to stress, even when individual tasks appear manageable.

This interpretation is also supported by evidence on staffing organization. Twigg et al. (2021) found that staffing approaches aimed at maintaining adequate nurse staffing tended to be associated with improved nursing outcomes. Drennan et al. (2024) also showed that low nursing staff numbers in acute care units were associated with delayed care and poorer service-quality indicators. Although these studies were conducted in settings different from puskesmas, their findings reinforce the importance of addressing workload through organizational measures rather than relying solely on individual coping strategies. Reviewing task allocation, staffing adequacy, work variety, and service organization should therefore be part of work stress management.

It is also important to consider variations across shifts and work periods. Abed Al Ahad et al. (2022), using a longitudinal design, showed that perceived workload, patient-to-nurse ratios, and rationed nursing care could vary across shifts and were related to nurses' work experience. Cho and Steege (2021) also demonstrated in a systematic review that demanding work environments, high workloads, and nonstandard work schedules contributed to nurse fatigue, which was associated with various nursing, organizational, and patient safety outcomes. These findings suggest that workload management in puskesmas should consider not only overall staffing levels but also task distribution and periods of increased service demand.

Nevertheless, the magnitude of the association between workload and work stress should be interpreted cautiously. The relatively wide confidence interval for the very heavy workload category indicates uncertainty in the estimated magnitude of the association. This may partly reflect the small number of respondents in this category. Therefore, the estimated odds ratio should not be interpreted as a definitive measure for the wider population of puskesmas nurses. The increasing pattern across workload categories provides support for an association between higher workload and greater odds of work stress. This interpretation is important to ensure that the conclusions do not exceed the limitations of the cross-sectional design and the available sample distribution.

In contrast to workload, age, sex, educational level, marital status, length of employment, interpersonal relationships, perceptions of the work environment, and knowledge were not significantly associated with work stress. These non-significant findings should not be interpreted as evidence that these factors are never related to work stress. Rather, they indicate that the differences across these categories in the study population were not sufficient to distinguish the occurrence of work stress statistically. Roetje et al. (2020) showed that nurses' work pressure is shaped by a combination of job demands and job resources rather than by individual characteristics alone. Palvimo et al. (2023) also found that job demands were positively associated with burnout, whereas job resources showed the opposite relationship and could even reduce the impact of high job demands.

Interpretation of these findings should also consider the distribution of respondents. Most respondents were concentrated in particular age and length-of-employment categories. In addition, favorable perceptions of interpersonal relationships and the work environment were predominant, and nearly all respondents had good or very good levels of knowledge. Such a concentration may have limited the variability needed to detect differences in work stress. Therefore, the absence of significant associations does not necessarily contradict other studies that have identified the importance of the work environment or interpersonal relationships, as exposure characteristics and distributions may differ across populations.

This consideration is particularly relevant to the work environment variable. Lake et al. (2019), in a meta-analysis, found that better nursing work environments were associated with improved nursing outcomes, service quality and safety, and patient outcomes. Ogata et al. (2021), in a large-scale longitudinal study in Japan, also found that more favorable assessments of the work environment were associated with better nursing outcomes. In the present study, most respondents perceived their work environment as comfortable or very comfortable. The limited variation in these perceptions may partly explain why the work environment was not significantly associated with work stress, rather than indicating that the work environment is generally unimportant to the health of nurses.

A similar interpretation applies to interpersonal relationships. Most respondents reported good or very good interpersonal relationships. However, Vallone and Zurlo (2024) showed that interpersonal conflict and stress among nurses may be interrelated and may interact with psychological conditions and life outside work. When interpersonal relationships within a population are relatively homogeneous and predominantly positive, the ability of this variable to distinguish between stressed and non-stressed groups may be limited. In this context, workload appeared to be a more salient factor in differentiating the occurrence of work stress among respondents.

Knowledge should also be interpreted carefully. Most respondents had good or very good levels of knowledge, while only a very small proportion were classified in the lower knowledge category. This distribution limits meaningful comparisons between knowledge groups. The findings did not indicate a statistically significant association between knowledge and work stress. Instead, the results provide stronger support for prioritizing workload management than for directing interventions solely toward improving nurses' knowledge, which was already generally high in this sample.

The implications of work stress also warrant consideration in relation to service quality and patient safety. This study did not directly measure service quality or patient safety; therefore, its findings cannot establish that work stress causes a decline in service quality. However, international evidence indicates that occupational pressure among healthcare workers has consequences that warrant attention. Tawfik et al. (2019), in a systematic review and meta-analysis, found an association between burnout and various indicators of service quality, although the authors also emphasized the heterogeneity and potential bias in the available evidence. More specifically, Li et al. (2024), in a

meta-analysis of studies involving nurses from different countries, found that nurse burnout was associated with a poorer safety climate, more missed care, medication errors, patient safety incidents, and lower perceived quality of care. These associations were relatively consistent across demographic and geographical groups. Although burnout and work stress are distinct concepts, this evidence highlights the importance of addressing organizational conditions that may affect nurses' well-being and their ability to provide safe care. Afandi et al. (2025) found that higher workload was associated with lower caring behavior among hospital nurses. Caring behavior was not assessed in the present study, but this evidence further supports the importance of managing nursing workloads as part of organizational efforts to support care delivery.

These implications are also relevant to Infection Prevention and Control (IPC), although they should be interpreted cautiously. This study did not measure adherence to IPC practices or healthcare-associated infection rates; therefore, it cannot establish that nurse stress causes infections. However, Assaye et al. (2021) found that inadequate staffing and high nursing workloads in healthcare facilities in low- and middle-income countries were associated with several adverse outcomes, including hospital-acquired infections and medication errors. Li et al. (2024) also reported associations between nurse burnout and safety-related events, including nosocomial infections. These findings provide a rationale for considering workload and stress management as supportive factors in creating work conditions conducive to safe practice, rather than as direct evidence that stress management will prevent infections.

Roetje et al. (2020) showed that, in addition to work overload, resources such as supervisor support, fair leadership, interpersonal relationships, autonomy, and professional resources are important for maintaining nursing staff well-being. Palvimo et al. (2023) also demonstrated that job resources can attenuate the negative relationship between job demands and burnout. Therefore, strategies in puskesmas should focus on evaluating task distribution, staffing adequacy, the allocation of responsibilities for in-facility and outreach services, opportunities for rest and recovery, leadership support, and regular monitoring of workload. These organizational considerations are also supported by evidence on staffing, work environments, and job demands (Shin et al., 2018; Lake et al., 2019; Twigg et al., 2021; Kaihlanen et al., 2023; Drennan et al., 2024).

Overall, the findings indicate that work stress among Puskesmas nurses should be understood in relation to the interaction between service demands and available work resources. Although individual characteristics and social and environmental conditions remain conceptually relevant, the findings of this study indicate that workload was the factor most clearly associated with work stress. Improvements in organizational conditions may therefore benefit nurses' well-being and support the continuity of healthcare services.

This study has several limitations. First, the cross-sectional design did not establish the temporal order of the variables; therefore, the association between workload and work stress cannot be interpreted as causal. Second, not all nurses invited to participate completed the data collection. Non-response bias is therefore possible if the characteristics of non-participating nurses differed from those of the respondents. Future studies are recommended to use longitudinal designs, measure workload in greater detail according to the type and timing of tasks performed, and include direct indicators of service performance and safety to evaluate more comprehensively the relationships among job demands, work stress, and healthcare outcomes.

CONCLUSION AND RECOMMENDATION

Work stress was prevalent among nurses working at puskesmas in Purbalingga Regency, and workload was the only factor significantly associated with work stress in this study. The findings highlight the importance of workload management, including appropriate task distribution and staffing organization, in supporting nurses' occupational health and healthcare service delivery.

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