an idea health journal
ISSN (online): 2797-0604

Impact of Nurse Workload on Work Efficiency, Patient Safety, and Job Satisfaction: A Cross-Sectional Study

Volume 6 No 2, Page 304-315

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Article Info:
Received:20 February, 2026
Revised: 13 April,2026
Accepted:14 April, 2026

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How to Cite:
Sukesi N, et al. Impact of Nurse Workload on Work Efficiency, Patient Safety, and Job Satisfaction: A Cross-Sectional Study. An Idea Health Journal.2026;6(02): 304-315.https://doi.org/10.53690/ihj.v6i02.673

Abstract

Background: Workload is a critical determinant of nursing performance and healthcare quality, influencing work efficiency, patient safety, and job satisfaction. Despite its importance, evidence regarding these relationships remains inconsistent. This study examined the associations among workload, work efficiency, patient safety, and job satisfaction among nurses

Methods: A cross-sectional study was conducted with 136 nurses. Data were collected using self-administered questionnaires and analyzed with SPSS version 26. Spearman's rank correlation assessed associations between variables, while the Kruskal–Wallis test compared job satisfaction across workload categories. Ordinal logistic regression identified predictors of job satisfaction. Model diagnostics included assessments of multicollinearity, model fit, pseudo R^2, and the proportional odds assumption.

Results: Workload demonstrated a weak but significant positive association with work efficiency ($\rho = 0.290$, $p < 0.001$) and a weak negative association with patient safety ($\rho = -0.231$, $p = 0.007$), but was not significantly related to job satisfaction. The Kruskal–Wallis test indicated no significant differences in job satisfaction across workload categories ($p = 0.392$). Ordinal logistic regression revealed that workload and work efficiency were not significant predictors of job satisfaction ($p > 0.05$), whereas patient safety was significantly associated with job satisfaction ($p < 0.001$). The model demonstrated acceptable fit ($\chi^2 = 15.452$, $p = 0.017$), modest explanatory power (Nagelkerke $R^2 = 0.182$), no multicollinearity (VIF < 5), and satisfied the proportional odds assumption ($p = 0.823$).

Conclusion: Overall, workload is associated with work efficiency and patient safety, although these relationships are weak. Job satisfaction appears to be more closely associated with patient safety than with workload. These findings inform workload management strategies in hospital settings and underscore the importance of strengthening patient safety culture alongside workload regulation.

Keywords: Job Satisfaction, Nurses' workload, Patient Safety

BACKGROUND

Workload is a fundamental component of nursing service systems and plays a pivotal role in determining the quality of healthcare delivery. As frontline healthcare providers, nurses are responsible for ensuring continuity of care, maintaining patient safety, and delivering effective clinical services. However, in contemporary healthcare settings, nurses are frequently exposed to demanding working conditions, including high patient acuity, imbalanced nurse-to-patient ratios, and increasing administrative responsibilities. These factors collectively contribute to elevated workload, which has been shown to compromise work efficiency, increase the likelihood of clinical errors, and adversely affect patient safety outcomes (1, 2).

From a theoretical standpoint, the relationship between workload and nursing outcomes can be explained through the Job Demand–Resources model. This model conceptualizes workload as a key job demand that requires sustained physical and psychological effort. When job demands exceed available resources, nurses are more likely to experience emotional exhaustion and reduced work performance. A high workload can trigger emotional exhaustion, which, in turn, reduces the quality of nursing care and nurses' job satisfaction (3). Recent evidence suggests that excessive workload contributes to burnout, decreased job satisfaction, and reduced quality of care, particularly in high-pressure clinical settings (4). This framework highlights the underlying mechanism through which workload affects both individual well-being and organizational performance.
In addition, the Donabedian model, which conceptualizes healthcare quality in terms of structure, process, and outcome, provides a complementary framework for understanding how workload influences healthcare delivery. Within this model, workload can be viewed as part of the structural dimension, reflecting staffing levels, resource allocation, and organizational conditions. These structural factors influence care processes, such as nursing performance, efficiency, and adherence to clinical procedures, which in turn determine outcomes, including patient safety and job satisfaction. Recent studies have applied this model to demonstrate that inadequate staffing and excessive workload are associated with poorer care processes and suboptimal patient outcomes (5,6).

This study simultaneously examines the relationship between workload and three main indicators of hospital nursing service quality: work efficiency, patient safety, and nurse job satisfaction. This study employs a comprehensive statistical approach to provide a deeper understanding of these relationships. In addition, this study offers practical solutions in the form of managerial strategies, including adjusting workloads to the ideal patient-nurse ratio, arranging fair work schedules, providing stress management training, and strengthening nursing leadership through psychosocial support. Despite extensive research, findings on the relationship between workload and nurse outcomes remain inconsistent, particularly in developing country settings. Furthermore, limited studies simultaneously examine efficiency, patient safety, and job satisfaction within a unified analytical framework
Based on the background, the aim of this study is to quantitatively analyze the effects of workload on work efficiency and patient safety, and to provide strategic recommendations for optimal workload management to improve work efficiency, patient safety, and nurse job satisfaction. It is expected that the results of this study can provide significant contributions in evidence-based policy making, as well as enrich the science in the field of nursing management, especially those related to workload management in hospitals.

METHODS

Study Design

This study employed a quantitative cross-sectional design conducted in several hospitals across Central Java and West Java, Indonesia.

Setting and Participants

The study population consisted of registered nurses directly involved in patient care within various clinical units, including inpatient wards, intensive care units, outpatient departments, emergency units, operating rooms, and central surgical installations. Participants were recruited using a probability sampling approach with a cluster sampling design, in which nurses were grouped by clinical unit. Inclusion criteria were: registered staff nurses, minimum educational level of Diploma III in Nursing, at least one year of clinical experience, and active employment during the study period. Nurses undergoing internship programs, on leave, or pursuing further education were excluded. A total of 136 nurses participated in the study. Data were collected using an online questionnaire distributed via Google Forms. Only complete responses were included in the analysis, and all submitted questionnaires met the completeness criteria.

Instrument

The independent variable in this study was workload, while the dependent variables included work efficiency, patient safety, and job satisfaction. The instrument used for data collection was the NASA-TL X workload questionnaire, with validity coefficients ranging from 0.329 to 0.779 and a reliability coefficient of 0.833 (7). Work efficiency questionnaire with validity test 0.850-0.921 and reliability test 0.982(8). Patient safety questionnaire with validity test ≥ 0.334 and reliability test produced a value of 0.928(9). Job Satisfaction using the Job Satisfaction Survey (JSS) questionnaire with a validity test of 0.61-0.90 and a reliability of 0.87(10). Workload is measured using the NASA-TLX questionnaire, which assesses perceived workload across multiple dimensions. The total score was categorized into three levels (low, moderate, high) based on percentile distribution to facilitate comparative analysis. Work Efficiency is assessed using a validated efficiency questionnaire reflecting task completion, time utilization, and performance outcomes (Very efficient, Efficient, Quite efficient, and Not efficient). Patient Safety is measured using a patient safety questionnaire that focuses on adherence to safety procedures and incident prevention practices (Very good, Good, and Enough). Job Satisfaction measured using the Job Satisfaction Survey (JSS), capturing multiple dimensions of satisfaction in the workplace (Satisfied and Quite satisfied)

Data Collection

The proportional odds assumption was assessed using the test of parallel lines and was found to be satisfied. Furthermore, particular attention was given to the potential impact of sparse data and imbalanced category distributions on regression estimates during the analytical process, as these conditions may affect the stability and reliability of the model. Data were collected using self-administered online questionnaires, which may be subject to response biases, including social desirability and recall bias. In addition, the online data-collection mode limits direct control over respondents' interpretations of questionnaire items. To mitigate these potential sources of bias, clear instructions were provided, and participant anonymity and confidentiality were strictly maintained.

Data Analysis

Data analysis was performed using SPSS version 26. Descriptive (univariate) analysis was conducted to summarize respondent characteristics and the distribution of study variables. Given that the data were not normally distributed and included ordinal measurements, nonparametric statistical methods were used. Spearman's rank correlation (ρ) was used to examine the relationship between workload and each dependent variable (work efficiency, patient safety, and job satisfaction), as it is appropriate for non-parametric data and monotonic relationships. The Kruskal–Wallis test was applied to evaluate differences in job satisfaction across workload categories (low, moderate, and high), as it allows comparison of more than two independent groups under non-parametric conditions. Ordinal

logistic regression was conducted to identify the most influential factors associated with job satisfaction, given that the dependent variable was ordinal. To ensure the robustness of the regression model, several diagnostic tests were performed. Multicollinearity was assessed using the Variance Inflation Factor (VIF), with all values below 5, indicating no significant multicollinearity. Model fit was evaluated using the likelihood ratio test, comparing the final model with the intercept-only model, along with pseudo R^2 measures (Cox & Snell and Nagelkerke) to estimate the model's explanatory power.

Ethical Considerations

Ethical approval was obtained from the Ethics Commission of University Widya Husada Semarang (No. 72EC-LPPM/UWHS/IV-2025). All participants received detailed information regarding the study objectives, procedures, risks, and benefits, and provided informed consent prior to participation.

RESULT AND DISCUSSION

RESULT

Respondent Characteristics

Table 1. Demographics characteristics of respondents (n = 136)'

Sociodemographics	n	%
Age		
<26 Years	36	26.5
26-35 Years	88	64.7
36-45 Years	10	7.4
>46 Years	2	1.5
Gender		
Man	26	19.1
Woman	110	80.9
Education		
Diploma	86	63.2
Nurse	50	36.8
Status		
Not married yet	38	27.9
Marry	98	72.1
Years of service		
> 5 years	56	41.2
< 5 years	80	58.8

Most respondents were aged 26–35 years (64.7%), predominantly female (80.9%), and held a Diploma III qualification (63.2%).

Table 2. Characteristics of workload, work efficiency, patient safety and job satisfaction

Variables	n	%
Workload		
Low workload	5	3.7
Medium workload	28	20.6
High workload	103	75.7
Work efficiency		
Very efficient	8	5.9
Efficient	40	29.4
Quite efficient	70	51.5
Not efficient	18	13.2

Patient safety		
Very good	13	9.6
Good	112	82.4
Enough	11	8.1
Job satisfaction		
Satisfied	124	91.2
Quite satisfied	12	8.8

Characteristics of nurses (75.7%) experienced a high workload, while 20.6% were at a moderate level, and only 3.7% had a low workload. The efficiency of nurses' work in this study ranged from sufficient to very efficient (86.8%), while the remaining 13.2% were in the inefficient category. Most respondents (82.4%) rated patient safety in their workplace in the "good" category, with 9.6% giving a "very good" rating and 8.1% rating it "sufficient". Nurses (91.2%) stated that they were satisfied with their work, while 8.8% felt quite satisfied, as seen in Table 2

Table 3. Spearman correlation test between workload and work efficiency, patient safety and job satisfaction

Correlation Between	Spearman's coefficient (ρ)	Significance (p-value)	Interpretation
Workload with Work Efficiency	ρ = 0.290	< 0.001	Weak positive relationship, significant
Workload with Patient Safety	ρ = -0.231	0.007	Weak negative elationship, significant
Workload with Job Satisfaction	ρ = -0.117	0.174	The negative relationship is very weak, not significant

The Spearman correlation analysis between workload and work efficiency, patient safety, and job satisfaction shows a weak but significant positive relationship between workload and work efficiency ($\rho = 0.290$; $p < 0.001$). This suggests that a higher workload is associated with a marginal increase in efficiency; however, the relationship remains weak. The relationship between workload and job satisfaction was found to be very weak, negative, and insignificant ($\rho = -0.117$; $p = 0.174$). This shows that in this context, workload does not have a direct effect on nurse job satisfaction as in Table 3. The results of the Spearman test show that workload has a significant relationship with work efficiency and patient safety, but is not significant with job satisfaction. The implications of these findings indicate the need for optimal workload management to maintain efficiency and patient safety.

Table 4. Kruskal Wallis test of job satisfaction levels with low, medium and high workload groups

Statistics	Mark
Kruskal-Wallis H	1,871
df (degrees of freedom)	2
p-value (Asymp. Sig)	0.392

The results of the Kruskal-Wallis test confirmed that there was no significant difference in the level of job satisfaction between workload groups (low, medium, and high ($\chi^2(2) = 1.871$, $p = 0.392$), as seen in Table 4. Thus, the level of nurse job satisfaction is not significantly influenced by the workload category.

Table 5. Results of Ordinal Logistic Regression Analysis: Predictors of Job Satisfaction

Predictor Variables	Category	Estimate (B)	Std. Error	Wald Value	Sig. (p)	Interpretation
Workload	Low	—	—	—	—	
	Currently	1.223	1,093	1.254	0.263	Not significant
	High	17,514	7598.553	0.000	0.998	Not significant
Work Efficiency	Very efficient	—	—	—	—	
	Efficient	-0.009	1.197	0.000	0.994	Not significant
	Quite efficient	-0.001	1.166	0.000	0.999	Not significant
	Not efficient	0.467	1,527	0.094	0.760	Not significant
Patient Safety	Enough	—	—	—	—	
	Good	-17,541	0.000	—	—	Significant ($p < 0.001$)
	Very good	-17,415	1.117	243,053	<0.001	Significant ($p < 0.001$)

Ordinal logistic regression analysis shows that workload and work efficiency do not significantly predict job satisfaction ($p > 0.05$), whereas patient safety does ($p < 0.001$), as shown in Table 5. Some regression estimates showed large standard errors, which may indicate instability in certain categories due to small subgroup sizes.

Table 6. Model Fit (Ordinal Logistic Regression)

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	148.326	–	–	–
Final Model	132.874	15.452	6	0.017

The model fitting results indicated that the final model significantly improved compared to the intercept-only model ($\chi^2 = 15.452$, $p = 0.017$), suggesting that the independent variables collectively contribute to predicting job satisfaction.

Table 7. Pseudo R-Square

Pseudo R^2	Value
Cox & Snell	0.108
Nagelkerke	0.182
McFadden	0.091

The pseudo R^2 values indicate that the model explains approximately 10.8% to 18.2% of the variance in job satisfaction, suggesting a relatively modest explanatory power.

Table 8. Multicollinearity (VIF)

Variable	VIF	Tolerance	Interpretation
Workload	1.42	0.704	No multicollinearity
Work Efficiency	1.68	0.595	Acceptable
Patient Safety	1.53	0.653	Acceptable

All predictor variables showed VIF values below 5 and tolerance values above 0.1, indicating no evidence of multicollinearity.

Table 9. Test of Parallel Lines

Model	-2 Log Likelihood	Chi-Square	df	Sig.
Null Hypothesis	132.874	–	–	–
General Model	129.990	2.884	6	0.823

The test of parallel lines was not statistically significant (p = 0.823), indicating that the proportional odds assumption was met.

DISCUSSION

This study explored the relationship between workload and three key indicators of nursing service quality: work efficiency, patient safety, and job satisfaction. The findings indicate that workload shows a weak but statistically significant relationship with work efficiency and patient safety, while no meaningful relationship was identified with job satisfaction. These results suggest that workload contributes to nursing outcomes; however, its influence appears limited and dependent on contextual factors. These findings inform workload management strategies in hospital settings, indicating that workload is weakly associated with work efficiency and may reflect adaptive responses among nurses, such as improved prioritization and task management. The weak positive relationship between workload and work efficiency ($\rho = 0.290$, $p < 0.001$) suggests that increased workload may coincide with adaptive responses among nurses, such as enhanced prioritization and more effective task management.

The weak positive association between workload and work efficiency ($\rho = 0.290$, $p < 0.001$) suggests that increased workload may coincide with adaptive responses among nurses, such as improved prioritization and task management. This finding can be interpreted within the Job Demand–Resources (JD-R) framework, where moderate job demands may stimulate performance when supported by adequate resources. However, the relatively small effect size indicates that this relationship should not be overstated. Prior studies have shown that while a manageable workload may enhance short-term performance, a sustained high workload is more likely to contribute to fatigue and decreased efficiency over time. In some conditions, an increased workload can stimulate focus and motivation, thereby increasing efficiency(11). However, other reviews warn that excessive workloads can actually cause fatigue and decreased efficiency(12). Work environment factors and organizational support are key to ensuring that increased workloads continue to have a positive impact (13). The importance of training and competency development as a mediator that strengthens the relationship (13)
.

In contrast, workload demonstrated a weak but significant negative association with patient safety ($\rho = -0.231$, $p = 0.007$. This suggests that a higher workload may be linked to reduced adherence to safety practices, potentially increasing the risk of clinical errors. From the perspective of the Donabedian model, workload represents a structural factor that may influence care processes, ultimately

affecting patient outcomes. Empirical evidence supports the association between increased workload and missed nursing care and adverse patient events (14). Although the association identified in this study is weak, it remains clinically relevant, given the critical importance of patient safety in healthcare settings. High workload contributed to decreased patient safety through decreased supervision and increased risk of clinical errors (13)(15) . Overload reduces the time nurses have to implement optimal safety practices (16). Therefore, effective workload management and organizational support are essential(17).

No significant relationship was found between workload and job satisfaction ($\rho = -0.117$, $p = 0.174$), and this finding was further supported by the Kruskal–Wallis test and ordinal logistic regression analysis. These results suggest that job satisfaction is not directly associated with workload alone. Instead, it is likely influenced by broader organizational and psychosocial factors, such as leadership, professional support, and work environment. Previous studies have similarly reported that job satisfaction among nurses is more strongly associated with organizational climate and perceived support than with workload intensity (18)(19). Other studies also support the idea that coping strategies and a good work environment can minimize the negative impact of workload on job satisfaction (20).

Importantly, the regression analysis identified patient safety as the only variable significantly associated with job satisfaction ($p < 0.001$). This finding indicates that nurses' perceptions of delivering safe and high-quality care are closely related to their professional satisfaction. When nurses perceive that patient safety is well maintained, they are more likely to experience a sense of accomplishment and meaning in their work. This is consistent with evidence showing that a positive patient safety culture is associated with higher job satisfaction and workforce retention (14). Patient safety had a significant influence, emphasizing the importance of psychological factors and organizational culture in determining job satisfaction. Positive perceptions of patient safety can increase nurses' job satisfaction (21)(22). This finding aligns with other studies that show that when nurses feel patient safety is maintained, they tend to have higher job satisfaction because their work is meaningful and has an impact (23). In addition, other studies have also found that perceptions of a positive patient safety culture are significantly correlated with increased motivation and job satisfaction of nursing staff (24). Under high work pressure, nurses may develop adaptive mechanisms that help them remain satisfied with their work despite increasing workload. This is reinforced by the fact that high workload does not always decrease job satisfaction, as long as there is adequate social support and job autonomy (25)(3). An environment that supports patient safety significantly increases nurses' motivation and job satisfaction (26). Therefore, patient safety is a dominant factor in shaping job satisfaction because it is directly related to work outcomes and the professional values nurses adopt.

From a methodological perspective, the regression diagnostics support the adequacy of the model. The model fit was statistically significant ($\chi^2 = 15.452$, $p = 0.017$), indicating that the included variables collectively explain job satisfaction. However, the pseudo R^2 values (0.108–0.182) indicate modest explanatory power, suggesting that additional variables not included in this study may play an important role. This is consistent with previous studies indicating that behavioral and organizational outcomes are often influenced by multiple unmeasured factors. Furthermore, no multicollinearity was detected ($VIF < 5$), indicating that the predictor variables were sufficiently independent, which is an essential assumption for regression stability (27). In addition, the proportional odds assumption was satisfied ($p = 0.823$), supporting the validity of the ordinal logistic regression model. This assumption is critical to ensure that the relationship between predictors and the ordinal outcome is consistent across categories.

This study has several limitations that should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships; therefore, the findings should be interpreted as associations rather than cause-and-effect relationships. Second, the use of self-reported data collected

through online questionnaires may introduce response bias, including social desirability and recall bias. Although anonymity was ensured, the accuracy of responses cannot be fully controlled. Third, this study was conducted in hospitals located in Java, Indonesia, which may limit the generalizability of the findings to other regions or healthcare systems with different organizational and cultural characteristics. Finally, although regression diagnostics indicated that the model was statistically adequate, the relatively modest explanatory power suggests that other relevant factors, such as leadership style, organizational climate, and psychological resilience, should be explored in future research.

CONCLUSION

This study identified a set of statistically significant but relatively weak associations between workload, work efficiency, patient safety, and nurse job satisfaction. Workload was found to be weakly but significantly associated with work efficiency, suggesting that, under certain conditions, higher workload may be associated with improved efficiency. However, given the limited strength of this relationship, the finding should be interpreted with caution. In contrast, workload was weakly and negatively associated with patient safety, suggesting that increased workload may be associated with a slight decline in safety outcomes. This highlights the need for careful workload management to mitigate risks of clinical errors and reduced supervision. No significant association was observed between workload and job satisfaction. This finding was further supported by the Kruskal–Wallis test and ordinal logistic regression analysis, which showed that neither workload nor work efficiency was a significant predictor of job satisfaction. Instead**,** patient safety emerged as the only significant factor associated with job satisfaction, suggesting that nurses' perceptions of safe and high-quality care are more closely related to their professional satisfaction than workload alone. The regression diagnostics indicated that the model was statistically adequate, with acceptable model fit, modest explanatory power, and no evidence of multicollinearity among predictors. Nevertheless, the relatively low pseudo R^2 values suggest that additional factors beyond those examined in this study contribute to variations in job satisfaction. Overall, these findings emphasize that workload should not be viewed as a sole determinant of nurse outcomes. Rather, its role appears to be context-dependent and intertwined with organizational and psychosocial factors. These findings inform workload management strategies in hospital settings, particularly the need to balance workload demands with adequate support systems and to strengthen patient safety culture as a key pathway for improving both care quality and nurse job satisfaction.

ACKNOWLEDGMENTS

The authors would like to thank all nurses who have been willing to be respondents in this study. Thanks are also given to the hospital management for the administrative support and data access provided. We would like to thank the rector of Widya Husada University, Semarang, the Head of LPPM, who funded this activity, and the colleagues who provided input during the research process and the writing of this article.

AUTHOR'S CONTRIBUTION STATEMENT

NS made substantial contributions to the study, including conceptualization, methodology development, software management, validation, and formal analysis. She was actively involved in the investigation process, data curation, and preparation of the original draft manuscript. In addition, she contributed to the writing review and editing process and was responsible for project administration and funding acquisition. Sk, AS made substantial contributions to the study, including conceptualization, methodology development, software management, validation, and formal analysis. She was actively involved in the investigation process, data curation, and preparation of the original draft manuscript.

RW contributed to conceptualization, software utilization, and validation. She participated in the investigation and data curation processes, contributed to writing, reviewing, and editing, and was involved in project administration. HP contributed to formal analysis, investigation, data curation, writing review and editing, and project administration. MK contributed to formal analysis, investigation, data curation, writing review and editing, and project administration.

CONFLICT OF INTEREST

The author declares that there is no conflict of interest that could affect the objectivity of this research.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

The authors declare that generative artificial intelligence (AI) and AI-assisted technologies were used exclusively to support the linguistic refinement of this manuscript. Specifically, tools such as ChatGPT, Scispace, Perplexity, Grammarly, and DeepL were utilized to enhance language quality, improve clarity of expression, and strengthen the overall readability and structural coherence of the text.

These technologies were employed solely for editorial assistance, including grammar correction, sentence restructuring, clarity-focused paraphrasing, and language polishing. They were not used to generate original scientific data, conduct analyses, interpret findings, or formulate the study's conclusions.

All intellectual content, study design, data analysis, interpretation of results, and final decisions regarding the manuscript remain the full responsibility of the authors. The authors have carefully reviewed and validated the final version of the manuscript to ensure its accuracy, integrity, and compliance with academic and ethical standards.

FUNDING

This research received funding support from Widya Husada University Semarang and did not receive funding support from any government, private, or non-profit organizations.

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