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The influence of human resource quality, workload, and work environment on the performance of nurses in the blood transfusion unit

Abstract

This study aims to analyse the influence of human resource quality, workload, and work environment on staff performance at the Blood Transfusion Unit of Ampana District General Hospital. The Blood Transfusion Unit plays a vital role in ensuring the availability of safe, high-quality, and timely blood supplies; therefore, staff performance is a crucial factor in supporting the quality of healthcare services. This research employed a quantitative approach using a survey method. The population comprised all staff of the Blood Transfusion Unit, and a census sampling technique was applied. Data were collected via questionnaires that had been tested for validity and reliability. Data analysis was conducted using descriptive and inferential statistics, specifically multiple linear regression, to examine both partial and simultaneous effects among the variables. The results indicate that human resource quality and the work environment have a positive and significant effect on staff performance, whilst workload has a negative and significant effect on staff performance. Simultaneously, the three independent variables significantly influence staff performance. The study concludes that improving staff competence and professionalism, managing workload proportionately, and creating a conducive work environment are key factors in enhancing staff performance and the overall quality of blood transfusion services.

Keywords: Human resource quality, workload, work environment, staff performance.

Abstrak

Penelitian ini bertujuan untuk menganalisis pengaruh human resource quality, workload, dan work environment terhadap staff performance pada Unit Transfusi Darah Rumah Sakit Umum Daerah Ampana. Unit Transfusi Darah memiliki peran yang sangat penting dalam menjamin ketersediaan darah yang aman, berkualitas, dan tepat waktu; oleh karena itu, staff performance menjadi faktor krusial dalam mendukung kualitas pelayanan kesehatan. Penelitian ini menggunakan pendekatan kuantitatif dengan metode survei. Populasi penelitian mencakup seluruh staf Unit Transfusi Darah, dengan teknik pengambilan sampel menggunakan metode sensus. Data dikumpulkan melalui kuesioner yang telah diuji validitas dan reliabilitasnya. Analisis data dilakukan menggunakan statistik deskriptif dan inferensial, khususnya regresi linier berganda, untuk menguji pengaruh parsial maupun simultan antar variabel. Hasil penelitian menunjukkan bahwa human resource quality dan work environment berpengaruh positif dan signifikan terhadap staff performance, sedangkan workload berpengaruh negatif dan signifikan terhadap staff performance. Secara simultan, ketiga variabel independen tersebut berpengaruh signifikan terhadap staff performance. Penelitian ini menyimpulkan bahwa peningkatan kompetensi dan profesionalisme staf, pengelolaan beban kerja secara proporsional, serta penciptaan lingkungan kerja yang kondusif merupakan faktor kunci dalam meningkatkan staff performance dan kualitas layanan transfusi darah secara keseluruhan.

Keywords: Human resource quality, workload, working environment, staff performance.

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1. Introduction

Effective healthcare services that are patient-safety oriented are a primary requirement in the modern healthcare system. Hospitals, as service-providing institutions, have a responsibility to ensure that all processes run efficiently, in accordance with standards, and safely. The success of services is determined not only by facilities and technology, but also by the quality of management and the performance of the human resources running hospital operations (Zehir & Zehir, 2023; Noor et al., 2024). Good management enables the optimal integration of planning, organising, executing, and supervising functions (Fawai et al, 2024).

One unit with a high level of complexity and risk is the Blood Transfusion Unit. Transfusion services are not merely technical laboratory procedures but are directly linked to patient safety. The role of this unit is crucial as it influences both clinical outcomes and the cost-efficiency of care (Marsaban & Nadjib, 2025). Therefore, blood transfusion services must meet strict standards in accordance with regulations, including Ministry of Health Regulation No. 91 of 2015. As a referral hospital in Tojo Una-Una District, Ampana General Hospital bears a strategic responsibility for the provision of healthcare services, including through the Hospital Blood Transfusion Unit (UTDRS). However, according to an internal report from 2024, there is a gap between blood demand and supply. This situation indicates operational pressure that has the potential to increase workloads and affect staff performance.

Staff performance is a key factor in ensuring service quality. Performance reflects the quality and quantity of work output in line with assigned responsibilities (Santoso, 2026). In the context of the Blood Transfusion Unit, performance is critical because procedural errors can have a direct impact on patient safety. Factors influencing performance include the quality of human resources, workload, and the working environment. The quality of human resources relates to competence, skills, and professionalism, which determine work effectiveness (Lering et al., 2023). Excessive workload can reduce concentration and increase the risk of errors (Poudel, 2025), whilst a conducive working environment plays a role in enhancing comfort and productivity (Kalkis, 2024). These three factors are crucial in the context of a Blood Transfusion Unit, which demands a high degree of precision and accuracy.

Although the relationship between the quality of human resources, workload, and the working environment on performance has been extensively studied, research specifically conducted on Blood Transfusion Units in regional hospitals remains limited. Yet, this unit is characterised by high risk, operational pressure, and safety standards that are stricter than those of other service units. Therefore, this study aims to address this gap by analysing the influence of these three factors on staff performance at the Blood Transfusion Unit of Ampana Regional General Hospital.

It is hoped that the results of this study will provide a theoretical contribution to the development of human resource management studies in the health sector, as well as a practical contribution to hospital management in formulating policies to improve staff performance in a more targeted manner and based on the high-risk context.

2. Literature review

2.1 *Management in healthcare organisations*

Management is a systematic process that encompasses planning, organising, executing, and monitoring in order to achieve organisational objectives effectively and efficiently (Tavo & Rasmus, 2024; Kurniawan et al., 2023). In the context of healthcare, management has a more complex dimension because it is not only oriented towards achieving organisational targets, but is also related to patient safety, service quality, and compliance with applicable regulations (Noor et al., 2024). As a public service organisation, hospitals are required to manage resources optimally in order to provide high-quality and sustainable services.

Hospital management encompasses various aspects, such as human resource management, operational management, financial management, logistics management, and quality management (Pratama & Purwanto, 2023). Each of these aspects is interrelated and requires effective coordination between service units. Effective coordination enhances the smooth running of services and minimises the risk of medical errors (Sathvika & Jeyalakshmi, 2026). Furthermore, the role of management is also crucial in creating a conducive working environment that supports improved staff performance (Pringadi et al., 2026).

2.2 *The blood transfusion unit in hospital care*

The Hospital Blood Transfusion Unit (UTDRS) is one of the service units with a high level of risk as it is directly related to patient safety. Blood transfusion services encompass the processes of donor selection, blood collection, laboratory testing, processing, storage, and distribution of blood to patients. The entire sequence of processes must be carried out in accordance with standard operating procedures and applicable regulations to ensure the safety and quality of the blood provided to patients.

Blood transfusion services have a significant impact on patient clinical outcomes and the cost-effectiveness of healthcare services (Marsaban & Nadjib, 2025). Optimising haematological management before, during, and after medical procedures also contributes to improving recovery rates and reducing the risk of transfusion-related complications (Nikolouzakis et al., 2026). Therefore, the provision of blood transfusion services in hospitals must meet the quality standards as stipulated in Ministry of Health Regulation No. 91 of 2015 on Blood Transfusion Service Standards.

As the referral hospital in Tojo Una-Una District, Ampana Regional General Hospital has a Blood Transfusion Unit that plays a vital role in supporting medical services, particularly in emergency cases and surgical procedures. The performance of staff in this unit is a crucial factor in ensuring the availability of safe, timely, and patient-specific blood supplies.

2.3 *Quality of human resources*

Human resources are the primary asset of an organisation, as the organisation's success is highly dependent on the competence and performance of its staff (Rony et al., 2024). The quality of human resources reflects the level of education, knowledge, technical skills, work attitude, productivity, innovation, and commitment to the organisation

(Mogea, 2023). In healthcare organisations, the quality of human resources plays a strategic role as it is directly linked to the quality of service and patient safety.

Previous research indicates that the quality of human resources has a significant impact on employee performance. (Rony et al., 2024) found that improvements in human resource competence have a positive impact on performance. (Lubis et al., 2026) also states that the quality of human resources has a strong relationship with increased productivity and work effectiveness. Conversely, low-quality human resources can reduce the efficiency and effectiveness of services (Fatra et al., 2025).

In the context of the Blood Transfusion Unit, the quality of human resources is crucial because blood transfusion services require precision, accuracy, and a deep understanding of workplace safety procedures. Competent and trained healthcare staff will be able to minimise the risk of errors and improve the quality of service.

2.4 Workload

Workload refers to the number of tasks or responsibilities that must be completed by an employee within a specific timeframe. Workload can be influenced by the volume of work, the level of task difficulty, completion time, and work-related pressure (Masruddin et al., 2026). An unbalanced workload can lead to physical and mental fatigue, which ultimately impacts performance.

Research by Lestari et al. (2024) and Apsari et al. (2025) indicates that workload has a significant impact on employee performance. Excessive workload can cause work-related stress, reduce concentration, and increase the potential for errors in task execution. Fatra et al. (2025) also emphasise that disproportionate workload can reduce productivity and the quality of work output.

In the Blood Transfusion Unit, workload often increases in line with high demand for blood, particularly during emergencies. Therefore, appropriate workload management is essential to ensure staff remain able to work optimally without compromising the quality of service.

2.5 Work Environment

The work environment encompasses all physical and non-physical conditions surrounding staff that may influence task performance. According to Tulin et al. (2026), the physical work environment includes lighting, temperature, ventilation, cleanliness, and workplace layout, whilst the non-physical work environment encompasses inter-staff relationships, communication, and the work atmosphere. A conducive work environment enhances staff comfort and work motivation.

Research by Nurhandayani (2022) and Santoso et al. (2023) indicates that the work environment has a positive and significant impact on employee performance. Dullah et al. (2023) states that a good work environment can boost productivity and work effectiveness. Conversely, an unsupportive work environment can dampen work morale and increase the risk of errors.

Within the Blood Transfusion Unit, a clean, safe, and standardised work environment is crucial as it relates to the storage and processing of blood, which requires specific conditions. A suboptimal work environment can hinder work efficiency and affect the quality of service.

3. Method

3.1 Type and source of data

This study employed a quantitative approach using both primary and secondary data. Primary data were collected directly from respondents via a questionnaire distributed to all staff of the Blood Transfusion Unit (UTDRS) at Ampana General Hospital using a census technique, ensuring the entire population served as the study's respondents. The research instrument was designed as a closed-ended questionnaire using a five-point Likert scale to measure the variables of human resource quality, workload, working environment, and staff performance based on respondents' perceptions. Meanwhile, secondary data was obtained from official hospital documents, internal reports, government regulations, and relevant scientific literature, such as organisational profiles, workforce numbers, blood demand and supply data, and applicable standard operating procedures. The use of a combination of primary and secondary data aims to enhance the validity of the research findings by integrating empirical data with the organisational context.

3.2 Data analysis methods

Data analysis was conducted using an inferential statistical approach with the aid of the Statistical Package for the Social Sciences (SPSS). The analysis stages included descriptive analysis, instrument quality testing, classical assumption testing, and hypothesis testing via multiple linear regression. Descriptive analysis was used to describe the characteristics of the respondents and the distribution of data through mean values, standard deviation, minimum values, and maximum values. Instrument quality testing was carried out through validity testing using *corrected item-total correlation* (calculated $r > \text{table } r$; $\text{sig} < 0.05$) and reliability testing using Cronbach's Alpha (> 0.70). Furthermore, classical assumption tests included a normality test (Kolmogorov-Smirnov or P-P Plot), a multicollinearity test ($\text{VIF} < 10$ and $\text{Tolerance} > 0.10$), and a heteroscedasticity test (Glejser test or scatterplot) to ensure the suitability of the regression model.

Hypothesis testing was conducted using multiple linear regression analysis to test the influence of human resource quality (X1), workload (X2), and work environment (X3) on staff performance (Y). The regression model used was

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon.$$

Although the data used is based on a Likert scale, regression analysis was still employed on the grounds that the data was treated as interval data and supported by tests of classical assumptions. Furthermore, to enhance the reliability of the results, additional tests were conducted and the results were interpreted with care. Hypothesis testing was carried out using partial tests (t-tests) and simultaneous tests (F-tests), supplemented by the coefficient of determination (R^2) to measure the model's ability to explain the variation in the dependent variable. The results of the analysis are presented in detail in the form of statistical tables containing regression coefficients, t-values, F-values, and R^2 to enhance the transparency and accountability of the research.

To minimise the potential for *common method bias* arising from the use of a single data source, this study also implemented procedural measures, such as the use of anonymous questionnaires, randomisation of questionnaire items, and additional statistical tests (e.g., Harman's single-factor test). Consequently, it is hoped that the research findings will possess a higher level of validity and reliability in explaining the influence of human resource quality, workload, and the working environment on the performance of staff at the Blood Transfusion Unit at Ampana Regional General Hospital.

4. Results

4.1 Descriptive analysis

Based on the results of the data analysis, this study involved all staff members of the Blood Transfusion Unit as respondents. Descriptive analysis indicates that, in general, the variables of human resource quality, workload, and working environment fall into the 'good' category, whilst the variable of staff performance also indicates a relatively high rating. The mean values for each variable suggest that respondents tend to give positive assessments of competence, working conditions, and the performance of duties.

The human resource quality variable had an average score indicating that staff possessed a good level of education, technical skills, and work commitment. This was reflected in the staff's ability to carry out blood transfusion procedures in accordance with applicable operational standards. Meanwhile, the workload variable indicates variations in perception among respondents, particularly regarding the volume of tasks and time pressure in meeting blood demand. The working environment variable received a relatively good score, although there are still some physical and spatial aspects deemed in need of improvement. As for the staff performance variable, it indicates that, in general, staff are able to complete tasks with good quality and a sense of responsibility.

The results of the instrument quality test showed that all statement items under the variables of human resource quality, workload, work environment, and staff performance met the validity criteria. This was demonstrated by corrected item-total correlation values greater than the *r*-table value at a significance level of less than 0.05. Consequently, each statement item in the questionnaire was deemed capable of accurately and precisely representing the constructs being measured. The validity of this instrument indicates that the questions posed to respondents align with the theoretical indicators of each variable. Furthermore, the results of the reliability test using Cronbach's Alpha show that all variables have an alpha value greater than 0.70. This value indicates that the research instrument possesses a good level of internal consistency, meaning respondents' answers are relatively stable and reliable for use in further analysis.

Furthermore, the results of the classical assumption tests indicate that the regression model used in this study meets the requirements for analysis. The normality test conducted using the Kolmogorov-Smirnov method yielded a significance value greater than 0.05, meaning the residual data are normally distributed. The normal distribution of the residuals is further supported by the Normal Probability Plot, which shows that the residual points are scattered around the diagonal line and follow its direction. This indicates that the regression model does not exhibit significant distributional deviations and can therefore be used for statistical hypothesis testing.

Furthermore, the results of the multicollinearity test show that all independent variables have a Tolerance value greater than 0.10 and a Variance Inflation Factor (VIF)

value less than 10. These findings indicate that there is no high correlation between the independent variables, meaning the regression model is free from multicollinearity. The heteroscedasticity test using the Glejser method also showed that all independent variables had significance values greater than 0.05, meaning there was no unequal residual variance. With all these classical assumptions met, the regression model used in this study is deemed valid and capable of providing accurate estimation results in analysing the influence of human resource quality, workload, and work environment on staff performance.

4.2 Multiple linear regression analysis

The results of the multiple linear regression analysis indicate that human resource quality, workload, and work environment simultaneously have a significant effect on staff performance. This is evidenced by the F-test results, which show a significance value of less than 0.05; consequently, the hypothesis stating a combined effect is accepted. These findings indicate that these three independent variables collectively make a tangible contribution to both improving and reducing staff performance levels. Consequently, the regression model used in this study is deemed valid and capable of explaining the structural relationship between human resource quality, workload, and the working environment on the performance of staff at the Blood Transfusion Unit. Conceptually, these results confirm that performance is not influenced by a single factor, but rather by a combination of interrelated internal organisational factors.

Partially, the quality of human resources was found to have a positive and significant effect on staff performance. A positive regression coefficient indicates that an improvement in the quality of human resources will be followed by an improvement in staff performance. This means that the higher the level of education, technical skills, procedural knowledge, and work commitment of staff, the more optimal the work outcomes achieved. In the context of the Blood Transfusion Unit, technical competence and precision in carrying out laboratory procedures are crucial for patient safety. Therefore, capacity building through continuous training, enhancing professional competence, and fostering work discipline are key strategies in maintaining and improving the quality of blood transfusion services. These findings reinforce the view that human resources are a strategic asset of the organisation that directly influences the operational effectiveness of healthcare services.

The workload variable also demonstrated a significant influence on staff performance. However, the direction of the coefficient indicates that a high workload tends to have a negative impact on performance if not managed proportionately. This suggests that an increase in the volume of work, without being balanced by a fair distribution of tasks and adequate resource support, can reduce productivity and work accuracy. Excessive workload has the potential to cause physical and mental fatigue, which may ultimately reduce concentration and increase the risk of errors in the performance of transfusion procedures. Therefore, management needs to evaluate staffing levels, shift systems, and task allocation to ensure that workload remains at a reasonable and manageable level. Effective workload management not only maintains performance but also safeguards patient safety and staff well-being.

Furthermore, the working environment has been shown to have a positive and significant impact on staff performance. A comfortable, safe, well-organised working environment that meets laboratory hygiene standards can enhance staff focus and attention to detail whilst carrying out their duties. Physical conditions such as lighting,

room temperature, ventilation, and the layout of laboratory equipment play a role in supporting work efficiency. Furthermore, a harmonious working atmosphere and good communication among staff help create a productive working environment. Thus, improving the working environment—both in terms of physical and non-physical aspects—is a strategic step in sustainably enhancing staff performance.

The coefficient of determination (R^2) indicates that the variables of human resource quality, workload, and work environment account for the majority of the variation in staff performance. This implies that the research model possesses a sufficiently strong explanatory power in predicting changes in performance based on changes in these three independent variables. However, there remains some variation in performance influenced by factors outside the research model, such as intrinsic motivation, leadership style, reward systems, and organisational culture. Therefore, further research could develop a more comprehensive model by incorporating additional variables to gain a deeper understanding of the determinants of staff performance at the Blood Transfusion Unit of the Ampana Regional General Hospital.

5. Discussion

The research findings indicate that human resource quality, workload, and work environment simultaneously exert a significant influence on staff performance. These findings suggest that the performance of staff in the Blood Transfusion Unit is not determined by a single factor but rather results from the interaction of various internal organisational aspects. Theoretically, this aligns with the concept that performance is a function of ability, motivation, and opportunity facilitated by the organisation. However, within the context of the Blood Transfusion Unit, this interaction becomes more complex due to the high demands for accuracy, speed, and safety standards that must be met simultaneously.

Partially, the quality of human resources has been shown to have a positive and significant impact on staff performance. This finding confirms that technical competence, attention to detail, and adherence to standard operating procedures are key factors in maintaining the quality of blood transfusion services. In the context of the Blood Transfusion Unit, even minor errors in the identification or examination process can have fatal consequences for patient safety; consequently, the quality of human resources affects not only productivity but also the level of service risk. This indicates that investment in continuous training and competency certification is not merely an administrative requirement but a crucial risk mitigation strategy.

Workload has also been shown to have a significant negative impact on performance. This finding needs to be understood in a more contextual manner, particularly within the operational context of Ampana Regional General Hospital as a district hospital with limited resources. The gap between blood demand and supply, as well as potential shortages in healthcare staff, has the potential to create high work pressure. In such situations, staff are not only required to work quickly but also to maintain a high level of accuracy, thereby increasing cognitive load and the risk of fatigue. These conditions may explain why an increased workload actually reduces performance, as there is a trade-off between the speed of service and the precision of procedures. Therefore, workload management in this context requires more than just task distribution; it also necessitates workforce planning based on service workload and the implementation of an adaptive work system.

The work environment also demonstrates a positive and significant influence on staff performance. However, within the context of the Blood Transfusion Unit, the work environment relates not only to comfort but also to compliance with safety standards and the efficiency of laboratory workflows. Limited space, sub-optimal equipment layout, or room conditions that do not meet standards can slow down work processes whilst increasing the potential for errors. Furthermore, the intense dynamics of teamwork in high-pressure situations also demand effective communication and coordination among staff members. Consequently, the work environment in this study encompasses a broader scope, including physical aspects, ergonomics, and social interactions that directly influence the quality of service.

Overall, the findings of this study indicate that improving the performance of Blood Transfusion Unit staff requires an integrated and context-specific approach. It is not enough simply to enhance individual competencies; this must also be balanced with realistic workload management and the creation of a working environment that supports safety standards and operational efficiency. The practical implications of this study should not stop at general recommendations, but should be directed towards policy priorities, such as workforce planning based on workload, optimisation of shift systems, increasing laboratory facility capacity, and strengthening risk-based training programmes. With such an approach, staff performance will not only improve quantitatively, but will also ensure the quality and safety of blood transfusion services on a sustainable basis.

6. Conclusion

Based on the research findings, it can be concluded that the quality of human resources, workload, and working environment have a significant influence on the performance of Blood Transfusion Unit staff, both simultaneously and individually. The quality of human resources has been shown to have a positive influence on performance, indicating that improvements in competence, technical skills, experience, and work commitment will drive the effectiveness and accuracy of task execution. Workload also has a significant influence; an unmanaged workload has the potential to reduce performance due to physical and mental fatigue, which can affect concentration and attention to detail. Meanwhile, a safe, comfortable, and supportive laboratory environment has been shown to enhance staff focus and productivity. Overall, improving staff performance at Ampana Regional General Hospital requires integrated management through strengthening human resource quality, balancing workloads, and improving the working environment to ensure the sustained quality of blood transfusion services and patient safety.

7. Theoretical and practical implications

Theoretically, this study contributes to the development of human resource management literature in the healthcare sector, particularly within high-risk service units such as the Blood Transfusion Unit. The findings of this study reinforce management theory stating that staff performance is influenced by a combination of individual competence and organisational conditions. The finding that human resource quality, workload, and the working environment significantly influence performance indicates that an integrative approach to organisational management is essential. This study also expands upon previous empirical research by testing these three variables simultaneously within the

context of blood transfusion services, an area that remains relatively under-explored in the literature on regional hospital management. Consequently, this study provides a conceptual foundation that performance improvement in healthcare organisations depends not only on individual factors but also on the comprehensive management of work systems and the organisational environment.

In practical terms, the findings of this study provide strategic implications for the management of Ampana Regional General Hospital in formulating policies to improve the performance of staff in the Blood Transfusion Unit. Management needs to prioritise competency development through continuous training and the enhancement of staff's technical capabilities. Furthermore, evaluating the distribution of workloads and the work scheduling system is crucial to prevent fatigue, which can lead to a decline in service quality. Improvements to the working environment, both in terms of physical aspects such as layout and laboratory facilities and non-physical aspects such as communication and teamwork, also require attention. By implementing integrated policies across these three aspects, the hospital can sustainably improve the quality of blood transfusion services whilst maintaining patient safety as the primary priority of healthcare provision.

8. Limitations and suggestions for further research

This study has several limitations that must be considered when interpreting the results. Firstly, the study was conducted at a single site, namely the Blood Transfusion Unit at Ampana Regional General Hospital; therefore, generalising the findings to other hospitals with different characteristics must be done with caution. Differences in hospital scale, the number of healthcare staff, management systems, and the level of service complexity may yield different findings. Secondly, this study employed a quantitative approach using a questionnaire based on respondents' perceptions; consequently, the possibility of subjective bias in the responses cannot be entirely avoided. Thirdly, the variables studied were limited to the quality of human resources, workload, and the working environment, whilst there are other factors that could potentially influence performance—such as work motivation, leadership style, reward systems, organisational culture, and job satisfaction—which were not included in the research model.

Given these limitations, future research is recommended to expand the scope of the study location by involving several different hospitals to enhance the generalisability of the research findings. Future studies may also employ a mixed-methods approach by incorporating in-depth interviews or direct observation to gain a more comprehensive understanding of the factors influencing staff performance. Furthermore, developing the research model by adding mediating or moderating variables, such as work motivation or leadership, could provide a more holistic picture of the determinants of performance in blood transfusion services. Consequently, further research is expected to enrich the study of human resource management in the health sector and provide more comprehensive and practical policy recommendations.

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