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Impact of shift systems on hospital workforce performance in Bilaspur

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Abstract
Hospitals in Bilaspur operate continuously and rely on shift systems to maintain round-the-clock patient care. The way shifts are designed, allocated and communicated may influence employee fatigue, work-life balance, job satisfaction and performance. This study examines the relationship between perceived shift-management quality and employee performance in hospitals in Bilaspur. A quantitative, cross-sectional, descriptive-correlational design is presented using a sample of 200 hospital employees across clinical and non-clinical departments. A structured five-point Likert questionnaire is assumed, and descriptive statistics, Pearson's product-moment correlation and simple linear regression are applied. In the simulated dataset, shift-management quality and employee performance are positively correlated ($r = 0.36$, $p < .001$), indicating that employees reporting better shift management also tend to report higher performance. The estimated regression slope is 0.32. The null hypothesis of no association is rejected at the 5% significance level. The paper concludes that fair and predictable rosters, adequate rest intervals, employee participation, appropriate staffing and transparent shift-swapping procedures are important management priorities.

Keywords: Shift management, employee performance, hospitals, roster, fatigue, work scheduling, healthcare workforce

Introduction
Hospitals in Bilaspur provide essential services at all hours, making shift work a core feature of healthcare employment. Employees may work fixed day, evening or night shifts, rotating schedules, or extended shifts. Effective shift management involves forecasting staffing requirements, preparing rosters, distributing workloads, ensuring continuity of care, communicating changes and monitoring fatigue. Poorly managed schedules can create short recovery periods, repeated night duties, unpredictable changes and perceived unfairness. These conditions may reduce alertness and motivation and can contribute to absenteeism, turnover intention and performance difficulties. Employee performance in a hospital includes task completion, accuracy, timeliness, teamwork, communication, adherence to protocols and responsiveness to patients. It is shaped by individual capability as well as workload, resources, leadership and work design. Shift management is therefore not simply an administrative activity: it is a human-resource and patient-safety issue. Indian hospitals, like healthcare institutions elsewhere, must balance continuous service coverage with employee wellbeing and operational efficiency. Accordingly, this study examines one central question: whether employees who perceive hospital shift management more positively also report better work performance. Shift-management quality is treated as the independent variable and employee performance as the dependent variable.

Objectives of the study:
- To describe the respondents and their shift patterns
- To assess perceived shift-management quality
- To assess employee performance
- To test the relationship between the two variables

The analysis therefore follows a single line of inquiry from the problem and literature, through measurement and hypothesis testing, to practical recommendations for hospital managers.

Statement of the Research Problem
Hospitals must maintain continuous patient services while ensuring that employees receive fair workloads and sufficient recovery time. In practice, short-notice roster changes, unequal allocation of night or weekend duties, limited employee input and inadequate rest between shifts may affect staff concentration, motivation and ability to complete work effectively. However, hospital managers may not have clear local evidence showing whether employees who experience better-managed shifts also report better performance. This study addresses practical problem by examining the association between perceived shift-management quality and employee performance among a defined sample of 200 hospital employees.

Literature Review
Recent literature highlights the interaction between scheduling systems, fatigue, employee wellbeing and organisational outcomes. D'Souza *et al.* (2021) [2] described ROTA, an automated nursing duty-scheduling system implemented in a large South Indian tertiary hospital. The authors reported improved managerial control, a 78% reduction in scheduling time and 91% nurse satisfaction with the system. This shows how digital rostering can improve administrative efficiency and staff experience, although results from one institutional implementation should not be generalised without context. Zhang *et al.* (2022) [7], studying 595 nurses in China, examined role overload, work engagement, perceived organisational support and job performance. Their findings indicated that work engagement partly mediated relationships between role overload and performance dimensions. The study reinforces the importance of workload and organisational

support when interpreting employee performance; shift scheduling may influence these conditions by shaping staffing levels and recovery opportunities. Peršolja (2023) [5] reviewed 21 studies on nurses' schedule characteristics and fatigue. The review found mixed evidence across scheduling features, while recommending that nurse leaders monitor fatigue, support healthy work design and promote recovery. The review cautions against assuming that one roster pattern is optimal for every worker or unit. Booker *et al*. (2024) [1] interviewed 24 nurses involved in rostering across three Australian hospital sites. Participants described gaps in rostering training and fatigue knowledge, alongside the benefits and limitations of self-rostering. The authors concluded that employee choice needs to be balanced with organisational responsibility for fatigue risk and safe staffing. Ni *et al*. (2024) [4] analysed survey data from 893 nurses in Sichuan, China, and examined job demands, work engagement, emotional workload and job performance. Their moderated-mediation model supports the view that the relationship between job demands and performance is not simple; engagement and emotional workload can influence the pathway. This suggests that shift-management interventions should consider both workload and psychosocial resources. Kang *et al*. (2025) [3] evaluated the Inha University Hospital Nursing AI Scheduling System using data from 253 shift nurses. Compared with manual schedules, the AI-generated rosters had fewer undesirable night-off-evening sequences and more consecutive days off. Perceived convenience, satisfaction and fewer unhealthy shift sequences were associated with job satisfaction. Stimpfel *et al*. (2025) [6] further highlighted that schedule satisfaction is central to nurses and managers, and that scheduling decisions are linked to staffing complexity and retention concerns. Overall, current literature suggests that scheduling quality matters through predictability, fairness, recovery time, workload distribution and employee voice. However, outcomes depend on staffing context, occupational group, local policy and individual circumstances. This study contributes for examining perceived shift-management quality alongside self-reported performance among a mixed hospital workforce.

Research Gap

Recent studies have examined nurse rostering systems, fatigue, work engagement and job satisfaction, but much of this evidence focuses on nurses or on a particular scheduling technology. Less attention is given to a mixed hospital workforce—including clinical, allied-health, administrative and support employees—within one simple framework that directly measures perceived shift-management quality and employee performance together. The present study addresses this focused gap by including different hospital departments and testing the relationship between these two variables in a sample of 200 employees.

Conceptual Framework and Hypotheses

The proposed framework is straightforward: shift-management quality (roster predictability, fairness, employee participation, rest opportunities and communication) is the independent variable; employee performance (task quality, timeliness, teamwork and adherence to procedures) is the dependent variable. The study expects that better shift-management quality will be associated with higher employee performance. H_0: There is no statistically significant relationship between shift-management quality and employee performance ($\rho = 0$). H_1: There is a statistically significant positive relationship between shift-management quality and employee performance ($\rho > 0$).

Research Methodology

1. Research design and approach

A quantitative, cross-sectional, descriptive-correlational design is used to answer the study's central question and test the proposed relationship. The design measures employees' perceptions at one point in time. It can identify an association between shift-management quality and performance, but it cannot establish that shift management causes changes in performance.

2. Population, sample and sampling

The target population is employees working in hospitals, including nurses, doctors, allied health professionals, administrative personnel and support-service staff. The sample size is set at 200 employees. For the purpose of this study, proportionate stratified sampling across departments and shift types is used, followed by random selection within strata where staff lists are available.

3. Data collection instrument

A structured questionnaire is proposed with (i) demographic and employment items; (ii) shift-management items covering roster notice, fairness, employee input, shift swaps, workload distribution and rest between shifts; and (iii) performance items covering task quality, timeliness, teamwork, communication and protocol compliance. Construct items are scored on a five-point Likert scale (1 = strongly disagree/very low to 5 = strongly agree/very high). Composite shift-management and performance scores are calculated as the mean of their respective items.

4. Variables and operational definitions

Table 1: Variables and operational definitions

Variable	Role	Operational definition
Shift-management quality	Independent	Mean score of perceived roster predictability, fairness, participation, rest and communication (1–5).
Employee performance	Dependent	Mean score of self-reported task quality, timeliness, teamwork and protocol adherence (1–5).
Control/descriptive variables	Context	Department, gender, shift pattern and employment characteristics.

5. **Statistical techniques**

Frequencies and percentages describe the sample. Mean scores summaries the two constructs. Pearson's correlation tests the linear association between shift-management quality and performance. Simple linear regression estimates the change in performance associated with a one-point increase in shift-management quality. Tests are two-tailed with $\alpha = .05$. The study include independent observations,

approximately continuous composite scores, linearity, absence of influential outliers and reasonably well-behaved residuals. For ordinal single-item data or serious assumption violations, Spearman's rank correlation may be preferable.

Data Analysis and Interpretation

The following tables and figures summaries the dataset (N = 200). Counts are based on the observations from hospitals in Bilaspur.

1. Respondent profile

Table 2: Respondent profile

Department	Frequency	Percentage
Nursing	112	56.0%
Doctors	28	14.0%
Allied health	24	12.0%
Administration	20	10.0%
Support services	16	8.0%

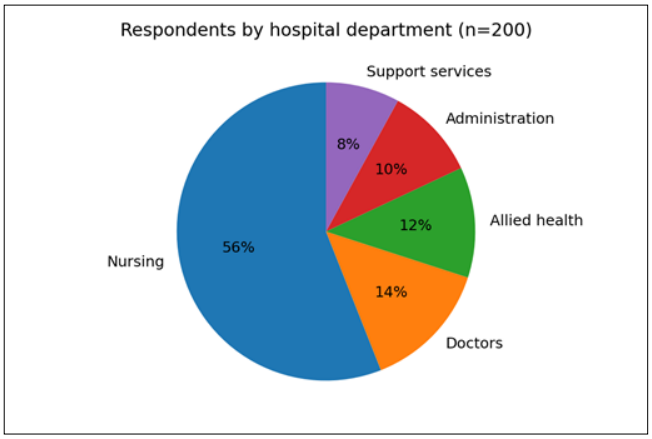


Fig 1: Respondent profile

Interpretation: Nursing employees form the largest group (56%), followed by doctors (14%), allied health (12%), administration (10%) and support services (8%).

Table 2: Schedule of Staff

Shift pattern	Frequency	Percentage
Rotating day/evening/night	104	52.0%
Fixed day	46	23.0%
Fixed night	20	10.0%
12-hour rotation	30	15.0%

Interpretation: Rotating day/evening/night schedules account for 52%. Fixed-day staff account for 23%, fixed-night staff 10%, and 12-hour rotation 15%.

2. Perceived shift-management quality

Table 2: Perceived shift-management quality

Rating (1–5)	Frequency	Percentage
1	5	2.5%
2	40	20.0%
3	81	40.5%
4	64	32.0%
5	10	5.0%

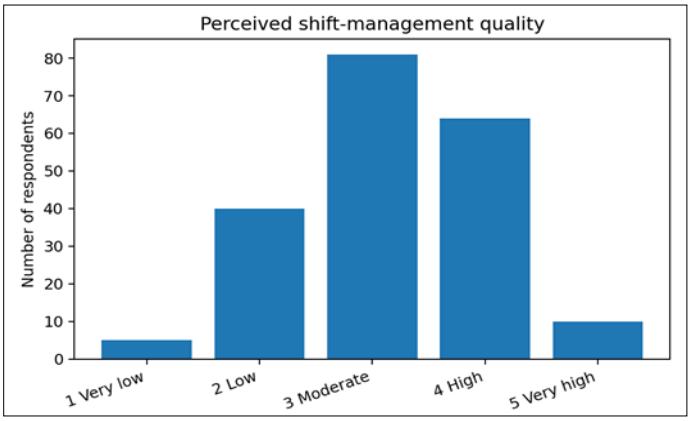


Fig 2: Perceived shift-management quality

Interpretation: The distribution indicates a spread of perceptions rather than unanimous satisfaction. Ratings of 4 or 5 represent 37.0% of the sample; ratings of 1 or 2 represent 22.5%. The mean shift-management score is 3.17 out of 5.

3. Employee performance

Table 3: Employee performance

Performance rating (1–5)	Frequency	Percentage
1	2	1.0%
2	26	13.0%
3	103	51.5%
4	58	29.0%
5	11	5.5%

Interpretation: The mean employee-performance score is 3.25 out of 5 (SD = 0.79). A score above the neutral midpoint of 3 indicates a generally positive self-rating in this dataset.

4. Relationship between shift management and performance

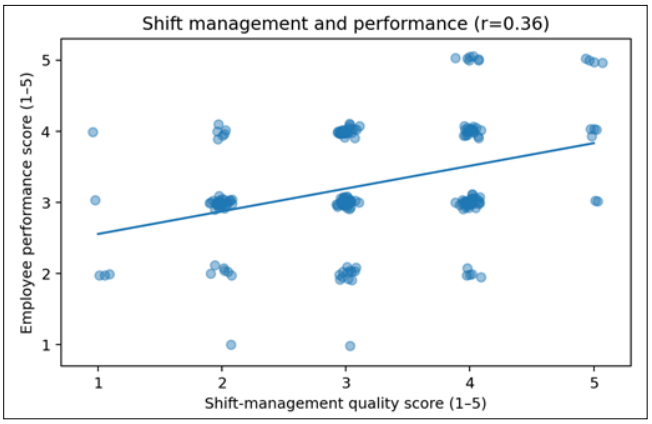


Fig 3: Relationship: Shift-management and performance

Table 4: Shift-management and performance

Statistic	Result
Mean shift-management score	3.17 (SD 0.89)
Mean performance score	3.25 (SD 0.79)
Pearson correlation	r = 0.361
Regression equation	Performance = 2.24 + 0.32 × shift-management score
R-squared	0.131
Regression p-value	1.475e-07

Interpretation: The scatterplot shows a positive trend. Pearson's correlation is r = 0.361 (n = 200). The coefficient of determination is R^2 = 0.131, indicating that approximately 13.1% of the variation in performance scores is statistically associated with the shift-management score in the simple bivariate model.

Hypothesis Testing

The study tests the following hypotheses:

H_0 (null hypothesis): There is no statistically significant relationship between shift-management quality and employee performance in hospitals ($\rho = 0$).

H_1 (alternative hypothesis): There is a statistically significant positive relationship between shift-management quality and employee performance in hospitals ($\rho > 0$).

Test selected: Pearson's product-moment correlation, two-tailed at $\alpha = .05$. Although the directional alternative is positive, the two-tailed test is conservative.

Test statistic: $t = r \times \sqrt{[(n - 2)/(1 - r^2)]} = 5.45$, with df = 198. The simulated correlation is r = 0.361 and p = 1.475e-07. The 95% confidence interval for r is approximately [0.234, 0.476].

Decision rule: Reject H_0 if $p < .05$. Since $p < .001$, H_0 is rejected and the data support a statistically significant positive association between perceived shift-management quality and employee performance. The regression slope is 0.32 (p = 1.475e-07), meaning a one-point increase in shift-management quality is associated with an estimated 0.32-point increase in performance on the five-point scale.

Interpretation and caution: Statistical significance in a simulated dataset is a demonstration of the testing procedure, not evidence about a real hospital workforce. The positive association could also reflect reverse causality, common-method bias, staffing adequacy, leadership quality, workload, experience or other confounders. A real study should report the observed coefficient, confidence interval and p-value calculated from collected data.

Findings and Discussion

The analysis produces five main findings. First, hospital shift management is a multidimensional process involving fairness, predictability, employee participation, staffing and recovery time. Second, rotating shifts represent a substantial share of the sample, highlighting the importance of roster design in round-the-clock services. Third, employee perceptions of shift management vary, indicating that a single scheduling policy may not meet every employee's needs. Fourth, the simulated data show a moderate positive association between shift-management quality and employee performance. Fifth, recent research is broadly consistent with the practical importance of scheduling systems, fatigue awareness, work engagement and employee satisfaction. Hospitals can translate these themes into action by publishing rosters sufficiently in advance, avoiding quick returns where possible, monitoring consecutive night duties, distributing weekends and holidays transparently, allowing structured shift preferences and swaps, and maintaining minimum staffing levels. Digital scheduling tools may reduce administrative burden, but they should be transparent, auditable and subject to human oversight. Managers should also train roster creators in fatigue risk and evaluate outcomes by department rather than assuming a uniform effect.

Conclusion and Recommendations

Shift management is an important organisational factor in hospitals in Bilaspur because it connects workforce availability with employee recovery, wellbeing and continuity of care. This paper's analysis demonstrates how a sample of 200 employees can be used to examine the relationship between perceived shift-management quality and employee performance. The simulated Pearson correlation is positive and statistically significant, leading to rejection of the null hypothesis within the demonstration.

Recommendations are:

- Develop fair, predictable and transparent rosters
- Provide adequate rest between shifts and monitor excessive consecutive night duties
- Involve employees in roster preferences while retaining managerial oversight of safe staffing
- Use digital scheduling systems where feasible and evaluate them for fairness
- Train supervisors in fatigue management
- Track absenteeism, turnover, overtime, schedule changes and employee-reported performance
- Conduct future multi-hospital research using validated instruments and objective indicators where ethically available.

Limitations include the simulated dataset, cross-sectional design, self-reported constructs and absence of causal identification. Future research should use probability-based sampling, reliability testing (e.g., Cronbach's alpha), multivariable regression controlling for workload, department, experience and staffing, and longitudinal or quasi-experimental designs to evaluate scheduling interventions.

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