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Reported Patient-Care Outcomes of Patient-to-Nurse Ratio in Selected Tertiary Hospitals in South-South Nigeria

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Abstract

This study examined the reported patient-care outcomes of patient-to-nurse ratio in selected tertiary hospitals in south-south Nigeria. The study adopted a cross-sectional survey design, with a population which comprised of 1,489 registered nurses working in three selected tertiary hospitals. The sample size was 440 selected using a multi-stage sampling procedure. Data was collected using structured questionnaires with a reliability coefficient of 0.78. Analysis was done using frequencies, percentages, mean, chi-square tests and one-way analysis of variance. The findings showed that 125 (30.6%) respondents reported a patient-to-nurse ratio greater than 1:10, while 94 (23.0%) were unsure of the prevailing ratio. During peak periods, 121 (29.6%) reported caring for 11–15 patients and 98 (24.0%) reported caring for more than 15 patients per nurse. Patient-to-nurse staffing category was significantly associated with reported mortality, $\chi^2(4) = 86.274$, $p < .001$, hospital-acquired infection, $\chi^2(3) = 107.635$, $p < .001$, and patient satisfaction, $\chi^2(4) = 73.127$, $p < .001$. The study concluded that there was a substantial variation in reported patient-to-nurse ratios across the participating hospitals, with a considerable proportion of respondents reporting high patient assignments, particularly during peak periods, and the reported outcomes were departmental mortality rate, reported hospital-acquired infection rate and reported patient-satisfaction score. It was recommended that each clinical unit should routinely document the number of patients and the number of nurses available for direct patient care during each shift to identify persistent staffing deficits. Also, hospital management should conduct structured reviews of staffing patterns, service demand, workforce availability and patient-care indicators at regular intervals.

Keywords: *Nurse, Outcomes, Patient-Care, Ratio, Tertiary Hospital.*

Introduction

Globally, the nursing workforce has expanded over recent years. Nevertheless, substantial disparities persist in the distribution of nurses between and within countries. The State of the World's Nursing 2025 reported that the global nursing workforce increased from approximately 27.9 million in 2018 to 29.8 million in 2023; however, this overall increase conceals considerable inequalities in workforce availability across geographical regions and socioeconomic settings (WHO, 2025). Therefore, the contemporary nursing workforce challenge extends beyond the absolute number of nurses available and encompasses their geographic distribution, employment, retention, working conditions, workload and deployment relative to population and patient-care needs.

The WHO Workload Indicators of Staffing Need framework estimates staffing requirements based on actual workload and activity standards rather than relying exclusively on population ratios or historical staffing establishments (WHO, 2023). This approach recognises that health workers require sufficient available working time to perform the activities expected of them. Accordingly, a staffing system that allocates nurses without considering workload may create apparent numerical adequacy. However, unequal distribution of nursing

personnel is particularly disturbing because nurses constitute the professional group that maintains the most continuous presence at the bedside in many hospital settings. Nurses assess patients, monitor physiological and clinical changes, administer medications and treatments, coordinate care, prevent complications, communicate with patients and families, provide health education, support activities of daily living and identify deterioration requiring escalation of care. Thus, the quantity and quality of nursing care available to hospitalised patients are influenced by the number of nurses available as well as by how those nurses are distributed across patients, wards and shifts.

Consequently, nurse staffing has become an important patient-safety, workforce-management and health-policy concern. Nurse staffing broadly describes the number and composition of nursing personnel available to provide care within a defined clinical environment and period. It may be measured using several indicators, including nursing hours per patient day, registered-nurse hours, skill mix, nurse-to-patient ratios and patient-to-nurse ratios (Griffiths et al., 2020; Twigg et al., 2021). Among these measures, the patient-to-nurse ratio provides a readily interpretable representation of workload by expressing the number of patients for whom an individual nurse is responsible during a defined period or shift. Within the context of this study, the patient-to-nurse ratio represents the number of patients assigned to or cared for by one nurse during a specified clinical period.

Policy changes can be used to give further insight. For example, McHugh et al (2021) looked at the effect of legal changes to nurse to patient ratios in hospitals in Queensland, Australia. Improvements in nurse staffing resulted in fewer deaths, re-admissions and shorter lengths of hospitalisation. Therefore, this study is very important as it shows that improving staffing can result in improved patient outcomes.

Inadequate nurse staffing may influence outcomes through several mechanisms. One important mechanism is reduced patient surveillance. Nurses are often the first healthcare professionals to identify subtle changes in patients' clinical conditions because of their continuous bedside presence. However, as the number of patients assigned to each nurse increases, the amount of time available for individual assessment and observation may decline. Consequently, deterioration may be recognised later, interventions may be delayed and opportunities for preventing complications may be lost.

Moreover, excessive patient assignments may compromise medication safety. Medication administration requires accurate identification, calculation, preparation, timing, documentation and monitoring. Increased workload, interruptions and time pressure may reduce the margin for error. Although adverse events are multifactorial and should not automatically be attributed to staffing alone, broader evidence consistently indicates that organisational conditions and nursing workload contribute to the safety environment in which medication and other clinical processes occur.

The staffing problem also affects the nursing workforce itself. Excessive workloads may contribute to fatigue, burnout, dissatisfaction and intentions to leave employment. In turn, staff attrition can worsen staffing shortages, producing a potentially self-reinforcing cycle. Bae (2024) identified associations between inadequate staffing and nurse turnover, while Li et al. (2024) demonstrated substantial relationships between nurse burnout and poorer safety, quality and patient satisfaction outcomes. Consequently, staffing inadequacy can simultaneously undermine patient outcomes and workforce sustainability.

These issues have particular relevance to Nigeria. The Nigerian health system faces longstanding human-resource challenges involving inadequate workforce supply relative to need, maldistribution, recruitment constraints, workforce migration, limited financing and deficiencies in workforce information and planning (AHOP, 2025; Federal Ministry of Health, 2021). Although Nigeria trains substantial numbers of nurses and other health professionals, the availability of trained personnel does not necessarily translate into adequate staffing in individual hospitals or wards. The study provided answers to the following research questions:

1. What are the existing patient-to-nurse ratios in the selected tertiary hospitals in South-South Nigeria?
2. What relationship exists between patient-to-nurse ratios and selected reported patient-care outcomes in the selected tertiary hospitals?

H_{01}: There is no statistically significant association between patient-to-nurse staffing category and selected reported patient-care outcomes in the selected tertiary hospitals in South-South Nigeria.

Methodology

Research Design: The study adopted a cross-sectional survey design. This design was considered appropriate because data on existing patient-to-nurse ratios, staffing patterns, staffing inadequacy,

Study Area: The study was conducted in the South-South geopolitical zone of Nigeria. The South-South zone, which forms a substantial part of the Niger Delta region, comprises six states: Rivers, Bayelsa, Delta, Edo, Akwa Ibom and Cross River States. Three tertiary hospitals located in three states within the geopolitical zone

participated in the study. These were Rivers State University Teaching Hospital in Rivers State, Delta State University Teaching Hospital in Delta State, and University of Uyo Teaching Hospital in Akwa Ibom State.

Population of the Study: The population of the study comprised registered nurses working in the three selected tertiary hospitals. The total nursing population across the three institutions was 1,489. The inclusion Criteria included registered nurses who: were employed in Rivers State University Teaching Hospital, Delta State University Teaching Hospital or University of Uyo Teaching Hospital; were available during the period of data collection; and provided informed consent to participate in the study.

Sample and Sampling Technique: The sample size of 440 was determined using the Cochran formula for estimating a population proportion: $n_0=Z^2p(1-p)/d$. Where: n_0 = initial minimum sample size;Z = standard normal deviate at 95% confidence level = 1.96; p = estimated population proportion = 0.50;1-p = 0.50; andd = margin of error = 0.05. Because a multistage sampling technique was employed, a design effect of 1.5 was applied to account for the potential loss of statistical efficiency.

A multistage sampling technique was used to select respondents for the quantitative component of the study. At the first stage, the South-South geopolitical zone of Nigeria constituted the study region. The zone comprises Rivers, Bayelsa, Delta, Edo, Akwa Ibom and Cross River States. The states were grouped geographically, after which three states were selected to provide representation within the zone. At the second stage, one tertiary hospital was selected from each of the three participating states. The selected institutions were Rivers State University Teaching Hospital (RSUTH), Rivers State; Delta State University Teaching Hospital (DELSUTH), Delta State; and University of Uyo Teaching Hospital (UUTH), Akwa Ibom State. At the third stage, the calculated sample of 440 respondents was allocated proportionately to the three hospitals according to their respective nursing populations. Within each selected hospital, eligible nurses were recruited from the relevant wards and clinical units in accordance with the study inclusion criteria until the required allocation was attained.

Instruments for Data Collection: A researcher-developed structured questionnaire was used to collect quantitative data from the nurses. The questionnaire was designed to address the aim and specific objectives of the study. The instrument contained items covering sociodemographic and professional characteristics, existing patient-to-nurse ratios, staffing inadequacy, staffing patterns, workload, selected reported patient-care outcomes, factors affecting appropriate staffing and recommendations for guideline development. The questionnaire obtained information on respondents' current patient-to-nurse ratio using categories such as 1:4, 1:5, 1:10, greater than 1:10 and unsure.

Validity of the Instruments: Face and content validity of the questionnaire was established. The draft instruments were given to three nursing specialists for evaluation. The experts examined the relevance of the items to the research purpose and objectives, clarity of the wording, suitability of the response styles, and the extent to which the items covered the subjects under consideration.

Reliability of the Instrument: The reliability of the instrument was determined by the split-half technique of reliability. The internal consistency of the quantitative instrument was tested with Cronbach's alpha. The minute study was not involved but nurses from the same population completed 44 questionnaires. The 90 questions of the questionnaire were analysed for reliability using the Statistical Package for the Social Sciences (SPSS) software (version 27). The instrument reliability Cronbach's alpha was 0.787. The coefficient was satisfactory internal consistence and thus justified the adoption of the questionnaire in the main study.

Method of Data Collection: Data collection procedure Structured Questionnaire was administered to all eligible nurses attending the selected hospitals. The researcher trained two research assistants to help him. The researcher and the assistants went to the selected hospitals and identified the eligible nurses in the various wards and clinical sections. Potential participants were informed of the aim of the study before they completed the questionnaire. Participants were advised that participation was voluntary and that they would not be penalised for failure to participate. Potential participants were asked questions before signing informed permission. Consenting respondents were issued questionnaires and retrieved upon completion. A total of 440 surveys were administered. Out of which 409 were correctly administered and hence usable for analysis, providing a response rate of 90.9%.

Method of Data Analysis: Qualitatively collected data was coded and input into the Statistical package for social sciences version 27 for analysis. Descriptive statistics were employed for summarising data. Frequencies and percentages were used to describe categorical variables. Quantitative/analytically coded variables were presented using suitable summary statistics, if available. Analyses were performed in line with the aims, goals, and hypotheses of the study.

Ethical Considerations: The study was based on the norms of ethics in research involving human subjects. In this regard, she received a letter of introduction from her nursing department and presented it to the appropriate research and administrative authorities. The Rivers State University research and ethical committees and Faculty of Basic Medical Sciences gave their clearance for the study.

Results

The results of the study are shown below:

Table 1: Association Between Patient-to-Nurse Staffing Category and Reported Departmental Mortality Rate (n = 409)

Reported mortality rate	Optimal n (%)	Not optimal n (%)	Total n (%)	*Pearson chi-square;* p-value
<5%	23 (31.9)	49 (68.1)	72 (100.0)	$\chi^2(4) = 86.27$; $p < 0.001$
5–10%	48 (48.5)	51 (51.5)	99 (100.0)	
11–15%	19 (23.8)	61 (76.3)	80 (100.0)	
>15%	8 (9.8)	74 (90.2)	82 (100.0)	
Unsure	23 (30.3)	53 (69.7)	76 (100.0)	
Total	**121 (29.6)**	**288 (70.4)**	**409 (100.0)**	

χ^2 = Pearson chi-square statistic; df = degrees of freedom. Percentages are row percentages. Statistical significance was set at $\alpha = .05$. Mortality categories represent respondents' reports of average departmental mortality over the preceding six months.

Table 1 shows that among respondents reporting mortality rates below 5%, 23 (31.9%) were in the optimal staffing category, while 49 (68.1%) were in the not-optimal category. For reported mortality rates of 5–10%, 48 (48.5%) were classified as optimal and 51 (51.5%) as not optimal. Among respondents reporting mortality rates of 11–15%, 19 (23.8%) were classified as optimal, while 61 (76.3%) were classified as not optimal. For mortality rates greater than 15%, 8 (9.8%) were within the optimal category, while 74 (90.2%) were within the not-optimal category. The Pearson chi-square test showed a statistically significant association between patient-to-nurse staffing category and reported departmental mortality rate, $\chi^2(4) = 86.27$, $p < .001$. Therefore, the null hypothesis was rejected for reported departmental mortality.

Table 2: Reported Patient-to-Nurse Ratios and Staffing Characteristics in the Selected Tertiary Hospitals (n = 409)

Variable	Response	Frequency (n)	Percentage (%)
Current patient-to-nurse ratio	1:4	34	8.3
	1:5	87	21.3
	1:10	69	16.9
	>1:10	125	30.6
	Unsure	94	23.0
Frequency of inadequate staffing	Never	35	8.6
	Rarely	133	32.5
	Occasionally	152	37.2
	Frequently	41	10.0
	Always	48	11.7
Duration of inadequate staffing	<6 months	66	16.1
	6–12 months	142	34.7
	1–2 years	117	28.6
	>2 years	66	16.1
	Never	18	4.4
Shift reporting greatest staffing inadequacy	Morning	90	22.0
	Afternoon	145	35.5
	Night	98	24.0
	Weekends	56	13.7
	Holidays	20	4.9
Patients assigned to one nurse during peak hours	<5	43	10.5
	5–10	98	24.0
	11–15	121	29.6
	>15	98	24.0
	Unsure	49	12.0
Current ratio affects ability to provide quality care	Yes	201	49.1
	No	113	27.6
	Unsure	95	23.2

Perceived impact of ratio on patient satisfaction	Significantly	261	63.8
	Somewhat	78	19.1
	Not at all	70	17.1
Most commonly used staffing pattern	8-hour shift	181	44.3
	12-hour shift	144	35.2
	Rotating shift	68	16.6
	Flexible scheduling	16	3.9

Patient-to-nurse ratios represent respondents' reports of staffing within their respective departments or units. A ratio of 1:10 denotes one nurse to approximately ten patients, while >1:10 denotes more than ten patients to one nurse. Percentages were calculated using n = 409.

Table 2 shows that 125 (30.6%) respondents reported a patient-to-nurse ratio greater than 1:10. This was followed by 87 (21.3%) who reported a ratio of 1:5, 69 (16.9%) who reported 1:10, and 34 (8.3%) who reported 1:4. A total of 94 (23.0%) respondents were unsure of the prevailing patient-to-nurse ratio. Regarding inadequate staffing, 152 (37.2%) respondents reported experiencing inadequate staffing occasionally, 48 (11.7%) reported always experiencing inadequate staffing, while 41 (10.0%) experienced it frequently. A total of 133 (32.5%) reported that inadequate staffing occurred rarely, whereas 35 (8.6%) reported never experiencing inadequate staffing.

Regarding the duration of inadequate staffing, 142 (34.7%) respondents indicated that the condition had been experienced for 6–12 months, 117 (28.6%) reported a duration of 1–2 years, while 66 (16.1%) reported a duration exceeding two years. Another 66 (16.1%) reported a duration below six months, while 18 (4.4%) indicated that they had never experienced inadequate staffing. The afternoon shift was most frequently reported as having inadequate staffing, accounting for 145 (35.5%) respondents. This was followed by the night shift, 98 (24.0%), morning shift, 90 (22.0%), weekends, 56 (13.7%), and holidays, 20 (4.9%).

During peak periods, 121 (29.6%) respondents reported that one nurse was assigned to 11–15 patients, while 98 (24.0%) reported more than 15 patients per nurse. Another 98 (24.0%) reported 5–10 patients per nurse, while 43 (10.5%) reported fewer than five patients. In relation to the ability to provide quality care, 201 (49.1%) respondents indicated that the current patient-to-nurse ratio affected their ability to provide quality care. A total of 113 (27.6%) indicated that it did not, while 95 (23.2%) were unsure. Regarding patient satisfaction, 261 (63.8%) respondents reported that patient-to-nurse ratios significantly affected patient satisfaction, while 78 (19.1%) reported some impact and 70 (17.1%) reported no impact. The 8-hour shift was the most commonly reported staffing pattern, accounting for 181 (44.3%) respondents. This was followed by 12-hour shifts, 144 (35.2%); rotating shifts, 68 (16.6%); and flexible scheduling, 16 (3.9%).

Table 3: Association Between Patient-to-Nurse Staffing Category and Reported Hospital-Acquired Infection Rate (n = 409)

Reported HAI rate	**Optimal n (%)**	**Not optimal n (%)**	**Total n (%)**	***Pearson chi-square;* p-value**
<2%	25 (53.2)	22 (46.8)	47 (100.0)	$\chi^2(3) = 107.63$, $p < 0.001$
2–5%	20 (24.4)	62 (75.6)	82 (100.0)	
6–10%	60 (28.2)	153 (71.8)	213 (100.0)	
Unsure	16 (23.9)	51 (76.1)	67 (100.0)	
Total	**121 (29.6)**	**288 (70.4)**	**409 (100.0)**	

HAI = hospital-acquired infection; χ^2 = Pearson chi-square statistic; df = degrees of freedom. Percentages are row percentages. Statistical significance was set at $\alpha = .05$. HAI categories represent respondents' reports of average departmental HAI rates over the preceding six months.

As presented in Table 3, among respondents reporting HAI rates below 2%, 25 (53.2%) were within the optimal staffing category, while 22 (46.8%) were within the not-optimal category. Among those reporting HAI rates of 2–5%, 20 (24.4%) were within the optimal category and 62 (75.6%) were within the not-optimal category.

For reported HAI rates of 6–10%, 60 (28.2%) respondents were classified as optimal, compared with 153 (71.8%) classified as not optimal. Among respondents who were unsure of the HAI rate, 16 (23.9%) were classified as optimal and 51 (76.1%) as not optimal. The Pearson chi-square test showed a statistically significant association between patient-to-nurse staffing category and reported HAI rate, $\chi^2(3) = 107.63$, $p < .001$. Therefore, the null hypothesis was rejected for reported hospital-acquired infection rate.

Table 4: Association Between Patient-to-Nurse Staffing Category and Reported Patient-Satisfaction Score (n = 409)

Reported patient-satisfaction score	Optimal n (%)	Not optimal n (%)	Total n (%)	*Pearson chi-square;* p-value
<70%	26 (23.0)	87 (77.0)	113 (100.0)	$\chi^2(4) = 73.12$, $p < 0.001$
70–80%	28 (23.9)	89 (76.1)	117 (100.0)	
81–90%	39 (39.0)	61 (61.0)	100 (100.0)	
>90%	15 (38.5)	24 (61.5)	39 (100.0)	
Unsure	13 (32.5)	27 (67.5)	40 (100.0)	
Total	**121 (29.6)**	**288 (70.4)**	**409 (100.0)**	

χ^2 = Pearson chi-square statistic; df = degrees of freedom. Percentages are row percentages. Statistical significance was set at α = .05. Patient-satisfaction categories represent respondents' reports of average departmental patient-satisfaction scores over the preceding six months.

Table 4 shows that among respondents reporting patient-satisfaction scores below 70%, 26 (23.0%) were within the optimal staffing category, while 87 (77.0%) were within the not-optimal category. For satisfaction scores of 70–80%, 28 (23.9%) were classified as optimal and 89 (76.1%) as not optimal. For satisfaction scores of 81–90%, 39 (39.0%) were within the optimal staffing category, and 61 (61.0%) were within the not-optimal category. Among those reporting scores above 90%, 15 (38.5%) were classified as optimal and 24 (61.5%) as not optimal.

The Pearson chi-square test showed a statistically significant association between patient-to-nurse staffing category and reported patient-satisfaction score, $\chi^2(4) = 73.12$, $p < .001$. Therefore, the null hypothesis was rejected for reported patient satisfaction. Since statistically significant associations were observed between patient-to-nurse staffing category and reported departmental mortality rate, reported hospital-acquired infection rate and reported patient-satisfaction score, the first null hypothesis was rejected.

Discussion of Findings

The findings of the study were discussed below:

One of the most important findings of the study was the considerable variation in the patient-to-nurse ratios reported by respondents. While 8.3% reported a ratio of 1:4 and 21.3% reported 1:5, 16.9% reported a ratio of 1:10 and 30.6% indicated that one nurse was responsible for more than ten patients. Moreover, almost one-quarter of respondents were unsure of the prevailing patient-to-nurse ratio in their clinical areas. These findings are important because available evidence increasingly indicates that higher patient assignments per registered nurse are associated with poorer patient outcomes. In a systematic review of longitudinal studies, Dall'Ora et al. (2022) found that higher registered-nurse staffing was consistently associated with a reduction in the risk of patient death, although heterogeneity in staffing measurement limited direct estimation of a universal safe ratio. Similarly, McHugh et al. (2021), in a prospective evaluation of nurse-to-patient ratio legislation in Queensland, demonstrated that improving staffing by approximately one patient per nurse was associated with reductions in mortality, readmission and length of hospital stay. The present findings are also consistent with evidence from low- and middle-income countries. Assaye et al. (2021), in a systematic review of acute-care settings in low- and middle-income countries, reported that lower nurse staffing and higher nursing workload were associated with increased in-hospital mortality, hospital-acquired infection, medication errors and other adverse outcomes.

Another important finding was the frequency and persistence of staffing inadequacy. More than one-third of respondents reported experiencing inadequate staffing occasionally, while a further proportion experienced it frequently or always. In addition, many respondents indicated that the problem had persisted for between six months and two years or longer. This suggests that the staffing problem was not limited to occasional short-term absences but reflected a more persistent workforce-management challenge. This finding is comparable with the Nigerian evidence reported by Ogbuabor et al. (2022), who found that nurses working in private hospitals in Enugu described inadequate staffing and high workload as major constraints on the quality of their working lives. Furthermore, the present study identified important shift-related variations. The afternoon shift was reported most frequently as the period of greatest staffing inadequacy, followed by the night shift. This pattern is particularly important because nursing demand continues outside conventional daytime administrative hours, while staff availability may reduce during evening, night, weekend and

holiday periods. Assaye et al. (2021) similarly found that night and weekend work in low- and middle-income settings was associated with greater risk of some adverse events, including medication errors. In addition, Imam et al. (2023) found that later shifts, particularly evening and night shifts, were among the contextual factors associated with greater levels of missed nursing care in low- and middle-income countries.

The finding that almost half of respondents believed the prevailing patient-to-nurse ratio affected their ability to provide quality care further strengthens the relevance of the staffing problem. Inadequate staffing can reduce the amount of time available for direct patient care, increase task prioritisation and potentially result in delayed or omitted nursing activities. Imam et al. (2023) reported that missed nursing care occurred across all major categories of nursing activity in low- and middle-income countries, with inadequate personnel numbers consistently emerging as the most important reported reason. Communication, comfort and other less immediately technical nursing activities were particularly vulnerable to omission. Similarly, an observational study from Ethiopia demonstrated high levels of missed nursing care and showed that greater missed care was associated with increased adverse patient-safety outcomes (Assaye et al., 2022).

The study demonstrated a statistically significant association between patient-to-nurse staffing category and reported departmental mortality rate. Respondents reporting mortality rates greater than 15% were predominantly found within the not-optimal staffing category. Although this finding cannot establish causality, it is consistent with a substantial body of contemporary evidence linking lower registered-nurse staffing with increased mortality. Dall'Ora et al. (2022) synthesised longitudinal evidence and concluded that a causal relationship between low registered-nurse staffing and mortality is plausible. Likewise, McHugh et al. (2021) provided stronger quasi-experimental evidence through evaluation of minimum ratio legislation in Australia. More recently, Griffiths et al. (2024) examined more than 600,000 admissions across 185 wards and found that exposure to days of low registered-nurse staffing was associated with increased risk of death. Moreover, the study demonstrated that the adverse effects of inadequate registered-nurse staffing could not simply be eliminated by substituting other staff groups or temporary workers. This is particularly relevant to the present study because it underscores that staffing optimisation should consider not merely total headcount but also the availability of appropriately qualified registered nurses.

Consequently, as the number of patients assigned to each nurse increases, there may be less time for repeated assessment and rapid response. This interpretation is compatible with evidence from emergency-care settings. Drennan et al. (2024) found that lower emergency-department nurse staffing was associated with longer waits, delays in medications and therapeutic interventions, prolonged length of stay and greater risk of serious adverse outcomes.

A statistically significant association was also observed between patient-to-nurse staffing category and reported hospital-acquired infection rates. Respondents reporting lower HAI rates contained a relatively larger proportion of optimal staffing, whereas higher reported HAI categories were predominantly represented within the not-optimal staffing group. This finding is consistent with evidence from low- and middle-income countries. Assaye et al. (2021) reported that inadequate nurse staffing and higher workload were associated with hospital-acquired infections across the studies included in their systematic review. Van et al. (2020) further demonstrated the potential relationship between nurse staffing and infection outcomes within a large health system implementing a formal staffing methodology. Their interrupted time-series analysis showed that greater nursing hours per patient day were associated with reductions in central line-associated bloodstream infection rates. The relationship between staffing, burnout and infection may also be interconnected. Li et al. (2024), in a systematic review and meta-analysis involving 85 studies and 288,581 nurses, found that nurse burnout was associated with more nosocomial infections, medication errors, falls, adverse events and missed care.

Patient-to-Nurse Ratios and Patient Satisfaction

Patient-to-nurse staffing category was also significantly associated with reported patient-satisfaction scores. Lower satisfaction categories contained a greater proportion of respondents classified within the not-optimal staffing group, whereas higher satisfaction categories contained relatively greater representation of the optimal group. The present finding is compatible with the broader relationship between nursing work conditions and patient experience. Li et al. (2024) found that nurse burnout was significantly associated with lower patient satisfaction, poorer safety and lower nurse-assessed quality of care. The significance of this evidence lies in its demonstration that workforce conditions can become visible to patients through the quality and responsiveness of care interactions. Furthermore, evidence concerning missed nursing care provides a plausible explanatory pathway. Imam et al. (2023) found that comfort and communication activities were among the aspects of care most frequently missed in resource-constrained settings. These activities may not always generate immediate clinical deterioration, yet they are central to patient-centred care and satisfaction.

Therefore, high staffing workloads may affect patient satisfaction even when technically essential activities continue to be completed.

Conclusion

The findings showed substantial variation in reported patient-to-nurse ratios across the participating hospitals, with a considerable proportion of respondents reporting high patient assignments, particularly during peak periods. The study further established statistically significant associations between patient-to-nurse staffing category and the selected reported patient-care outcomes. Specifically, patient-to-nurse staffing category was significantly associated with reported departmental mortality rate, reported hospital-acquired infection rate and reported patient-satisfaction score. In addition, patient-to-nurse ratio scores differed significantly across the selected tertiary hospitals.

Recommendations

Based specifically on the findings of the study, the following recommendations are made:

1. Each clinical unit should routinely document the number of patients and the number of nurses available for direct patient care during each shift to identify persistent staffing deficits.
2. Hospital management should conduct structured reviews of staffing patterns, service demand, workforce availability and patient-care indicators at regular intervals.
3. Reported mortality, hospital-acquired infection, patient satisfaction and other relevant quality indicators should be reviewed together with staffing data to support evidence-informed workforce decisions.

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