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Application of the Workload Indicators of Staffing (WISN) Method for Optimal Staffing at Jimmy Medika Borneo Mother and Child Hospital

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INDEXING

Keywords:
WISN;
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Workload;
Hospital management;
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ABSTRACT

This study aims to analyze the application of the Workload Indicators of Staffing Need (WISN) method in determining the optimal staffing requirements at Jimmy Medika Borneo Mother and Child Hospital (RSIA). In response to the significant increase in patient volume from 2021 to 2024, RSIA JMB requires an accurate human resource management strategy to avoid workload imbalances. This descriptive qualitative study involved 57 healthcare workers across 12 units, using a work sampling method involving observation and interviews with all healthcare personnel at RSIA JMB, combined with the calculation of WISN scores and ratios as recommended by the WHO. Data were collected from various service units, including emergency nurses, operating room nurses, inpatient and outpatient nurses, general practitioners, midwives in delivery and perinatal care, pharmacists, laboratory staff, and medical specialists. The results showed variations in available working time and imbalances in WISN ratios across units, with the WISN ratio varying from 0.5 to 1. Several units were overworked, including pharmacy staff, emergency nurses, operating room nurses, outpatient nurses, midwives in VK-Perina, emergency general practitioners, obstetricians and gynecologists, and surgical oncologists. In contrast, the laboratory unit was categorized as underworked, while balanced workloads were found among inpatient nurses, pediatricians, and internal medicine specialists. These findings serve as a basis for RSIA JMB management to conduct strategic evaluations and redistribute health personnel to enhance service efficiency and improve healthcare worker well-being.

Kata kunci:
WISN;
Kebutuhan tenaga kerja;
Beban kerja;
Manajemen Rumah Sakit;
Pelayanan kesehatan

Penelitian ini bertujuan untuk menganalisis penerapan Workload Indicators of Staffing Need (WISN) dalam menentukan kebutuhan tenaga kerja yang optimal di Rumah Sakit Ibu dan Anak (RSIA) Jimmy Medika Borneo (JMB). Menghadapi peningkatan signifikan jumlah pasien dari tahun 2021 hingga 2024, RSIA JMB memerlukan strategi manajemen sumber daya manusia yang akurat untuk menghindari ketimpangan beban kerja. Penelitian ini adalah penelitian kualitatif deskriptif, yang melibatkan 57 pekerja kesehatan dari 12 unit, dengan metode work sampling yaitu dilakukan observasi dan wawancara pada seluruh tenaga kesehatan di RSIA JMB serta perhitungan skor dan rasio WISN dari WHO. Data dikumpulkan dari berbagai unit pelayanan yang mencakup perawat IGD, perawat OK, perawat rawat inap, perawat rawat jalan, dokter umum, bidan VK-Perina, tenaga farmasi, tenaga laboratorium, serta dokter spesialis. Hasil penelitian menunjukkan variasi waktu kerja tersedia dan ketidakseimbangan rasio WISN antar unit, dengan rasio WISN merentang dari 0,5 hingga 1. Beberapa unit mengalami overwork seperti tenaga farmasi, perawat IGD, perawat OK, perawat rawat jalan, bidan VK-Perina, dokter umum IGD, dokter spesialis obgyn, dan dokter bedah onkologi sementara unit laboratorium mengalami underwork dan beban kerja ditemukan sesuai pada perawat rawat inap, dokter spesialis anak, dan dokter spesialis penyakit dalam. Temuan ini menjadi dasar bagi manajemen RSIA JMB untuk melakukan evaluasi dan redistribusi tenaga kesehatan secara strategis guna meningkatkan efisiensi pelayanan dan kesejahteraan tenaga medis.

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INTRODUCTION

Organizations function as dynamic systems where tasks, responsibilities, and authority are coordinated to achieve shared goals (Syaodih et al., 2022). Core elements include

individuals, common objectives, and the structural framework that supports operations. In hospitals, aligning human resources with service demands is essential, as health workers directly influence care quality, efficiency, and patient outcomes.

Jimmy Medika Borneo Mother and Child Hospital (RSIA), established in Samarinda in 2021, has rapidly increased patient visits: from 1,215 in 2021 to 14,516 in 2024. This growing workload and rising case complexity have challenged existing staffing levels, potentially affecting service quality and creating uneven workloads. An objective, data-based method is needed to determine staffing requirements accurately.

The Workload Indicator of Staffing Need (WISN) method, developed by the World Health Organization, calculates staffing needs based on actual workloads (Yulliswandi et al., 2022). It supports balanced staffing decisions, identifies shortages or surpluses, and improves workforce planning. Compared to traditional population-based methods, WISN produces more precise and context-specific results using real-time data on service delivery, working hours, and support tasks to estimate staffing requirements more precisely (Widowati, 2021; Okoroafor et al., 2019; WHO, 2023).

Theoretically, WISN is grounded in principles of performance-based resource allocation and workforce optimization. It uses workload components such as main activity standards, annual service volumes, available working time, and adjustment factors, allowing for a detailed calculation of WISN scores and staffing ratios (Govule et al., 2015; Nasution et al., 2020). These indicators reveal whether a health facility is under-, over-, or adequately staffed. A WISN ratio = 1 implies balance, <1 indicates understaffing, and >1 suggests overstaffing.

The methodological relevance of WISN lies in its adaptability to local contexts and its focus on actual service volume and complexity. For instance, the method considers critical differences in clinical settings such as emergency departments, maternity care, and outpatient services—each with distinct workloads. Empirical studies have shown that high workloads, particularly in nursing units, are associated with burnout, medical errors, and reduced patient safety. High workloads, especially in nursing, are associated with fatigue, lower job satisfaction, and increased risk of errors (Aiken et al., 2014; van den Berg et al., 2009).

Despite its advantages, WISN has not been widely applied in newer, fast-growing hospitals in Indonesia. There remains a gap in evidence on how such institutions manage workforce planning using workload-based tools. This study addresses that gap by applying the WISN method at Jimmy Medika Borneo Mother and Child Hospital (RSIA). It aims to calculate available working time, determine required staffing per category, and assess adequacy using WISN ratios across all units.

RESEARCH METHOD

The study design is a qualitative descriptive study with an observational approach. The study employed a qualitative descriptive design with an observational approach. Fifty-seven (57) health workers from 12 Jimmy Medika Borneo Mother and Child Hospital (RSIA) units participated in this research. Data were collected over two months using the work sampling method, which involved direct observation and structured interviews with nurses, midwives, laborants, general practitioners, specialists, and hospital management.

Qualitative research is a scientific approach to understanding social phenomena within their natural context by exploring individuals' or groups' meanings, experiences, and

perspectives. This type of research emphasizes a deep understanding of complex social realities rather than hypothesis testing or quantitative measurement (Komara et al., 2022). Qualitative approach data analysis includes three main steps that consist of data reduction, data display, and conclusion drawing/verification. Data reduction involved selecting and organizing key information from interviews and observations to focus on research objectives. The reduced data were presented in structured forms such as descriptive narratives and tables to facilitate pattern recognition. Finally, conclusions were drawn through iterative verification to ensure consistency and validity of the findings (Miles et al., 2018). We aimed to understand social phenomena within their natural context by exploring the meaning, experiences, and perspectives of individuals or groups through holistic methods such as in-depth interviews, observation, and document analysis (Creswell, 2013; Denzin & Lincoln, 2018). Descriptive research systematically portrayed the characteristics of phenomena and current conditions without testing hypotheses or establishing causality (Sukmadinata & Syaodih, 2017). We employed direct observation and structured interviews with nurses, general practitioners, specialists, and hospital management. We analyzed the data using descriptive statistical techniques to understand workforce dynamics comprehensively. To ensure the validity and reliability of the data, this study applied methodological triangulation by cross-verifying information obtained from interviews, observations, and document analysis. Triangulation helped reduce bias and enhance the credibility of findings.

We collected 57 healthcare workers across 12 units. All data collection was done through interviews. Data were analyzed using descriptive statistical techniques and the WHO-recommended WISN calculation, which includes measures such as Available Working Time (AWT), Standard Workload (SW), Category Allowance Standard percentage (CAS%), Category Allowance Factor (CAF), and Individual Allowance Factor (IAF). The primary outcome measure was the WISN ratio, used to assess staffing adequacy across all units.

RESULTS AND DISCUSSION

Annual Working Time and Standard Workload

The annual AWT was 1,608 hours for pharmacy staff, emergency department nurses, operating room nurses, laboratory staff, outpatient nurses, inpatient nurses, and midwives. General practitioners in the emergency department recorded 1,512 hours per year. Pediatric specialists in the outpatient clinic had 319.5 hours annually. Obstetrics–gynecology specialists had 426 hours per year. Internal medicine specialists had 528 hours per year. Oncologic surgery specialists had 330 hours per year. Findings on SW were highly varied across departments. Emergency department nursing staff had the highest SW across the department (SW = 19,296), specifically on administering suppositories and performing skin tests. The lowest SW was from pharmacy and maternity units (SW = 67), specifically on stock-taking tasks and observation duty. Within departments of the doctors, internists had the highest SW, and emergency general practitioners had the lowest SW.

Hospital standard workload depends on patient volume, service complexity, workforce availability, and management policies. Increases in outpatient, inpatient, or emergency department visits raise the overall workload for medical staff (Basalamah et al., 2022; Cesilia & Kosasih, 2024; Tuzzakiyah et al., 2022). Prior studies showed that surges in patient volume directly increase nurse workload and can affect service quality and staff well-being

(Kusumaningrum et al., 2022; Setiyawan, 2020). Case complexity significantly impacts hospital workload, as critically ill or chronically ill patients demand more time, attention, and clinical skill than those with milder conditions, while also involving more inter-department collaborations (Gulo et al., 2024; Prawitasari et al., 2009; Arianto et al., 2022). Therefore, hospitals must regularly evaluate healthcare worker workload and adjust staffing levels according to patient complexity to ensure optimal service delivery and protect staff well-being (Lee et al., 2019; Arianto et al., 2022).

Category Allowance and WISN Ratio

Pharmacy staff recorded the lowest CAS% of 17.77%. In contrast, emergency department nursing staff recorded the highest CAS% of 73.54%. In the emergency department nursing staff, the CAF ranged from 1.00 in all specialist departments to 3.77. IAF spanned from 0 in all specialist departments to 0.78 for pharmacy staff. The highest health workforce requirements at Jimmy Medika Borneo Mother and Child Hospital (RSIA) based on the WISN Score are found in the Maternity ward (13 personnel), Inpatient ward nurses (10 personnel), and Pharmacy unit staff (10 personnel), followed by Emergency department general practitioners (8 personnel), Emergency department nurses (7 personnel), Operating room nurses (6 personnel), and Outpatient ward nurses (5 personnel). Other required positions include Laboratory unit staff (4 personnel), ObGyn clinic Specialists (4 personnel), Pediatricians (4 personnel), and Surgical Oncologists (2 personnel), while the lowest staffing requirement is for Internist clinic specialists (1 personnel). Additionally, findings on the WISN ratio were varied. Eight departments were overworked, three were well-balanced, and one was underworked. The oncology surgery department had the lowest WISN ratio (0.5), and the laboratory unit had the highest WISN ratio (1.25).

The available healthcare workforce often exceeds the actual needs based on workload, which can be attributed to factors such as imbalanced distribution of healthcare professionals across units, with some areas overstaffed compared to patient needs, and fluctuations in patient volume, where lower patient visits may make the workforce appear excessive (Asres & Gessesse, 2024; de Menezes et al., 2022; Farrasizdihar et al., 2021). Policies following standard workforce regulations without considering the actual hospital conditions may also result in a high WISN ratio, and inefficient use of labor can exacerbate the issue, leading to wasted resources and imbalanced workloads (Asres & Gessesse, 2024; Thum et al., 2024). In hospitals with high patient visits, particularly in emergency departments and maternity units, a WISN ratio below 1 indicates a shortage of healthcare workers, leading to fatigue, medical errors, and decreased service quality due to longer patient waiting times. Hospitals should adjust recruitment policies, redistribute workloads, and optimize efficiency to balance workforce numbers with actual workload demands (Adritama et al., 2022). Hospitals must adopt a comprehensive strategy to optimize human resources, medical facilities, technology, and budget to ensure consistent, high-quality healthcare services (Hulu, 2023; Purwadhi et al., 2024; Bambang Sulistyo & Dety Mulyanti, 2023).

Table 1. Data on Available Working Time (AWT) and Standard Workload (SW) on Each Working Unit in Jimmy Medika Borneo Mother and Child Hospital (RSIA)

Categories	AWT (hours)	AWT (minutes)	SW	
			Highest	Lowest
Pharmacy unit	1.608	96.480	9.648	67
Emergency department nursing staff	1.608	96.480	19.296	1.608
Operating room nursing staff	1.608	96.480	4.824	804
Laboratory unit	1.608	96.480	4824	1929.6
Outpatient ward nursing staff	1.608	96.480	6.432	1929.6
Inpatient ward nursing staff	1.608	96.480	9.648	1.608
Emergency department general practitioners	1512	90.720	2.016	252
Maternity ward	1.608	96.480	6,432	67
Pediatric clinic	319.5	19.170	1.278	639
ObGyn clinic	426	25.560	1.704	496
Internist clinic	528	31.680	2.112	1.056
Oncology surgery clinic	330	19.800	1.320	220

Source: *Processed by the author, 2025*

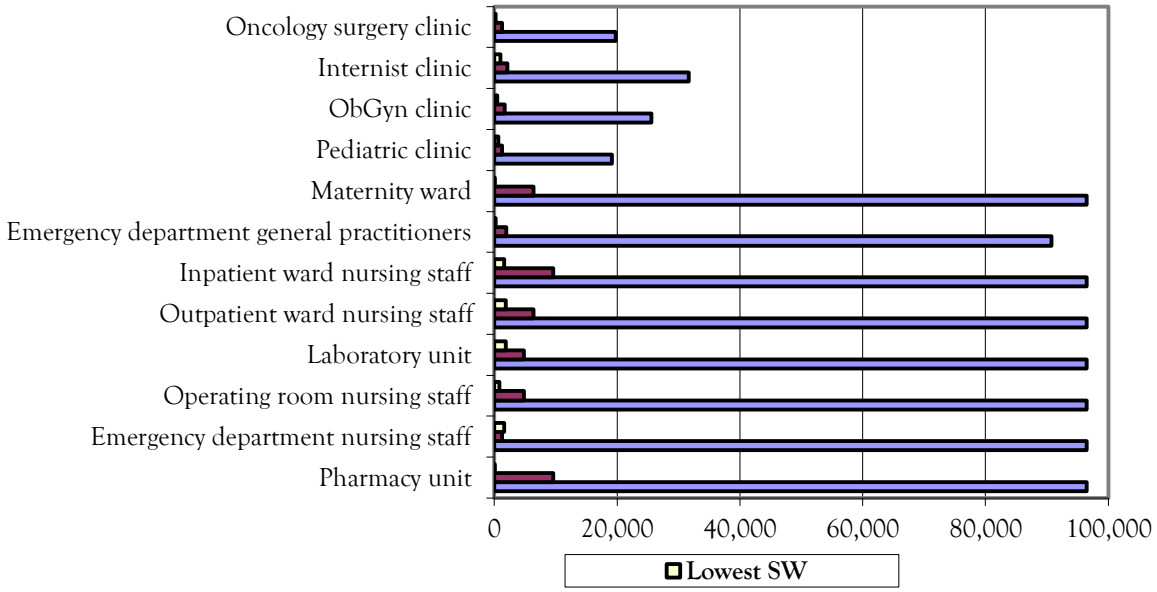

Figure 1. Visualization of AWT and SW on Each Working Unit in Jimmy Medika Borneo Mother and Child Hospital (RSIA)

Source: *Processed by the author, 2025*

Table 2. Data on Category Allowance Standard Percentage (CAS%), Category Allowance Factor (CAF), Individual Allowance Factor (IAF), and WISN Ratio on Each Working Unit in Jimmy Medika Borneo Mother and Child Hospital (RSIA)

Categories	Basic Human Resource Needs	CAS%	CAF	IAF	WISN		
					Score	Ratio	Interpretation
Pharmacy unit	7.3	17.77	1.21	0.78	9.66	0.6	Overwork
Emergency department nursing staff	1.86	73.54	3.77	0.11	7.15	0.71	Overwork
Operating room nursing staff	4.85	24.94	1.33	0.04	6.51	0.67	Overwork
Laboratory unit	2.83	25.76	1.34	0.05	3.8	1.25	Underwork
Outpatient ward nursing staff	4.32	14.33	1.16	0.05	5	0.8	Overwork
Inpatient ward nursing staff	4.35	56.87	2.31	0.06	10.1	1	Balance
Emergency department general practitioners	6.49	17.89	1.21	0.22	8.13	0.62	Overwork
Maternity ward	7.04	44.64	1.8	0.08	12.8	0.69	Overwork
Pediatric clinic	3.31	0	1	0	3.31	1	Balance
ObGyn clinic	3.23	0	1	0	3.94	0.75	Overwork
Internist clinic	0.5	0	1	0	0.5	1	Balance
Oncology surgery clinic	1.56	0	1	0	1.56	0.5	Overwork

Source: *Processed by the author, 2025*

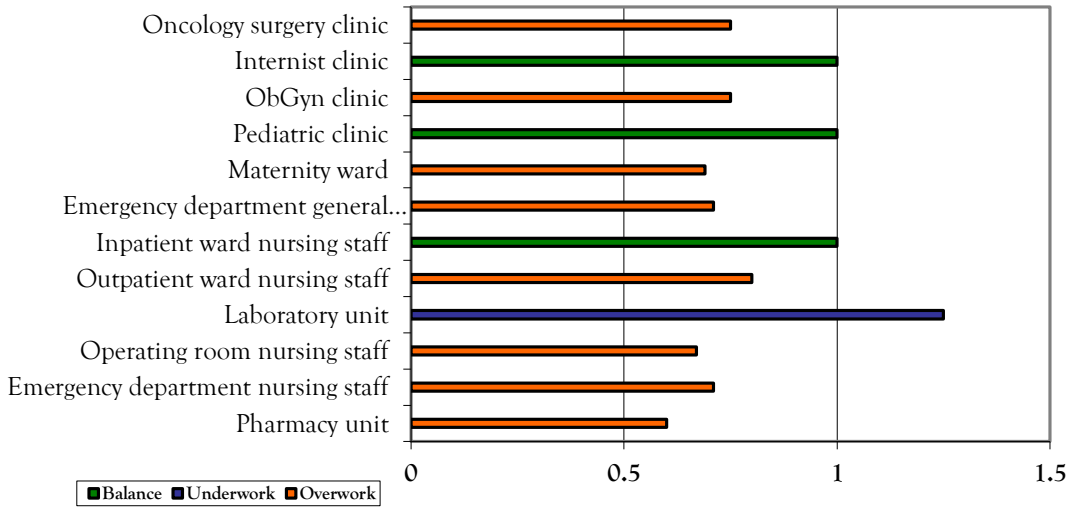

Figure 2. Visualization of the WISN Ratio on Each Working unit in Jimmy Medika Borneo Mother and Child Hospital (RSIA)

Source: *Processed by the author, 2025*

CONCLUSION

Jimmy Medika Borneo Mother and Child Hospital (RSIA) shows significant variation in annual working hours across healthcare roles, with most non-specialist staff averaging 1,608 hours, while specialists work fewer hours depending on their field. The WISN analysis reveals imbalances, with several units experiencing understaffing and excessive workloads, while others, like the laboratory, show overstaffing, indicating the need for better workforce distribution. These findings suggest hospital management must regularly evaluate workloads, adjust staffing levels accordingly, and optimize resource use to maintain service quality amid rising patient numbers. Future efforts should include redistributing staff between overworked and underworked units. The WISN method enables more objective, evidence-based planning of healthcare personnel in alignment with real service demands. Strategic actions such as redistributing staff, adjusting recruitment priorities, and implementing routine WISN-based assessments are essential to address inefficiencies and avoid service degradation.

Adopting WISN improves operational efficiency and supports healthcare workers' well-being, patient safety, and sustainable quality of care, making it a vital tool for workforce planning in modern hospitals.

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REFERENCES

Adritama, T. A., Nyorong, M., & Yuniati, Y. (2022). Analisis Kebutuhan Perawat Igd Berdasarkan Beban Kerja Studi Kasus. *Indonesian Journal of Hospital Administration*, *5*(1), 19. https://doi.org/10.21927/ijhaa.2022.5(1).19-26

Aiken, L. H., Sloane, D. M., Bruyneel, L., Van den Heede, K., Griffiths, P., Busse, R., Diomidous, M., Kinnunen, J., Kózka, M., Lesaffre, E., McHugh, M. D., Moreno-Casbas, M. T., Rafferty, A. M., Schwendimann, R., Scott, P. A., Tishelman, C., van Achterberg, T., & Sermeus, W. (2014). Nurse staffing and education and hospital mortality in nine European countries: a retrospective observational study. *The Lancet*, *383*(9931), 1824–1830. https://doi.org/10.1016/S0140-6736(13)62631-8

Arianto, A. B., Rosanti, E. F., & Barus, L. S. (2022). Gambaran Karakteristik Pasien Kritis di Area Critical Unit. *Jurnal Kesehatan*, *10*(1), 67–74. https://doi.org/10.55912/jks.v10i1.51

Asres, G. D., & Gessesse, Y. K. (2024). Workload Indicators of Staffing Need (WISN) method for health workforce planning at health facility: A scoping review. *Human Factors in Healthcare*, *6*, 100078. https://doi.org/10.1016/j.hfh.2024.100078

Bambang Sulistyo, & Dety Mulyanti. (2023). Strategi Manajemen Kesehatan di Rumah Sakit: Memaksimalkan Pelayanan Pasien dan Efisiensi Operasional. *Jurnal Sains Dan Kesehatan*, *7*(1), 09–19. https://doi.org/10.57214/jusika.v7i1.273

Basalamah, F. F., Ahri, R. A., & Arman, A. (2022). Pengaruh Kelelahan Kerja, Stress Kerja, Motivasi Kerja dan Beban Kerja Terhadap Kinerja Perawat Di RSUD Kota Makassar. *An Idea Health Journal*, *1*(02), 67–80. https://doi.org/10.53690/ihj.v1i02.33

Cesilia, R., & Kosasih, K. (2024). Pengaruh Beban Kerja dan Kelelahan Kerja terhadap Kinerja Perawat. *Jurnal Sosial Teknologi*, *4*(10), 909–922. https://doi.org/10.59188/jurnalsostech.v4i10.26775

Creswell, J. W. (2013). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (3rd ed.). Sage Publication.

de Menezes, A. A., Soares, C. L. M., Poz, M. R. D., & Pinto, I. C. M. (2022). Application of the workload indicators of staffing need method to calculate the size of the medical staff at a maternity hospital in the state of Bahia, Brazil. *Human Resources for Health*, *19*(S1), 116. https://doi.org/10.1186/s12960-021-00660-6

Denzin, N. K., & Lincoln, Y. S. (2018). *The SAGE Handbook of Qualitative Research* (5th Edition). Sage Publications.

Farrasizdihar, D., Girsang, E., & Ramadhani Nasution, S. L. (2021). Analysis of workforce requirements based on WISN in radiology installation of RSU X. *JMMR (Jurnal Medicoeticolegal Dan Manajemen Rumah Sakit)*, *10*(1), LAYOUTING. https://doi.org/10.18196/jmmr.v10i1.10376

Govule, P., Mugisha, J. F., Katongole, S. P., Maniple, E., Nanyingi, M., & Onzima, R. A. D. (2015). Application of Workload Indicators of Staffing Needs (WISN) in Determining Health Workers' Requirements for Mityana General Hospital, Uganda. *International Journal of Public Health Research*, *3*(5), 254–263.

Gulo, A. R. B., Hasibuan, E. K., & Saragih, M. (2024). Hubungan Beban Kerja dan Motivasi dengan Kinerja Perawat di Ruang Rawat Inap RSU Sari Mutiara Lubuk Pakam. *Jurnal Ilmu Kedokteran Dan Kesehatan*, *11*(4), 686–699. https://doi.org/10.33024/jikk.v11i4.15094

Hulu, S. R. K. (2023). Analisis Rencana Strategis Sumber Daya Manusia (SDM) Keperawatan Di Rumah Sakit Wilayah Jakarta. *Indonesian Journal of Nursing Scientific*, *3*(1), 41–48. https://doi.org/10.58467/ijons.v3i1.61

Komara, E., Syaodih, E., & Andriani, R. (2022). *Metode Penelitian Kualitatif dan Kuantitatif*. PT. Refika Aditama.

Kusumaningrum, P. R., Rusminingsih, E., & Jayadi, R. N. (2022). Hubungan Beban Kerja Dengan Tingkat Stres Kerja Perawat Di Instalasi Gawat Darurat. *Jurnal Kepemimpinan Dan Manajemen Keperawatan*, *5*(1), 31–37. https://doi.org/10.32584/jkmk.v5i1.1462

Lee, H., Ryu, K., Sohn, Y., Kim, J., Suh, G. Y., & Kim, E. (2019). Impact on Patient Outcomes of Pharmacist Participation in Multidisciplinary Critical Care Teams: A Systematic Review and Meta-Analysis*. *Critical Care Medicine*, *47*(9), 1243–1250. https://doi.org/10.1097/CCM.0000000000003830

Miles, M. B., Huberman, A. M., & Saldana, J. (2018). *Qualitative Data Analysis A Methods Sourcebook* ((4th ed.)). SAGE Publications.

Nasution, A. N., Nasution, S. L. R., & Nasution, S. W. (2020). Perhitungan Kebutuhan Tenaga Medis Berdasarkan Workload Indicators of Staffing Need (WISN): Studi Kasus di Rs A, Rs B, Rs C, Rs D. *Jurnal Keperawatan Muhammadiyah*, *5*(2). https://doi.org/10.30651/jkm.v5i2.6195

Okoroafor, S., Ngobua, S., Titus, M., & Opubo, I. (2019). Applying the workload indicators of staffing needs method in determining frontline health workforce staffing for primary level facilities in Rivers state Nigeria. *Global Health Research and Policy*, *4*(1), 35. https://doi.org/10.1186/s41256-019-0125-z

Prawitasari, S., Sitorus, R., & Hariyati, T. S. (2009). *Hubungan beban kerja perawat pelaksana dengan keselamatan pasien di Rumah Sakit Husada Jakarta* [Universitas Indonesia]. https://lontar.ui.ac.id/detail?id=125327

Purwadhi, P., Restiani, Y., Adrian, W. I., & Harianto, M. I. F. (2024). Strategi Pengelolaan Sumber Daya untuk Keberlanjutan Operasional Rumah Sakit. *Innovative: Journal Of Social Science Research*, *4*(6), 507–516.

Setiyawan, A. E. (2020). Overview Of Nurse's Workload In The Emergency Room Of The Undata Hospital, Central Sulawesi Province. *Preventif : Jurnal Kesehatan Masyarakat*, *11*(1), 38–46. https://doi.org/10.22487/preventif.v11i1.53

Sukmadinata, S., & Syaodih, N. (2017). *Metode Penelitian Pendidikan* ((12th ed.)). Remaja Rosdakarya.

Syaodih, E., Andriani, R., & Purwadhi, P. (2022). *Teori dan Praktik Organisasi* ((1st ed.)). PT. Refika Aditama.

Thum, R., Wehner, C., & Goetz, O. (2024). Using the Workload Indicators of Staffing Need (WISN) – method to asses HR requirements and optimize processes in health care. *SHS Web of Conferences*, *184*, 02008. https://doi.org/10.1051/shsconf/202418402008

Tuzzakiyah, E., Kartika, R. C., Ayu, D. P., Fitriyah, D., & Puspita, S. D. (2022). Analisis Kebutuhan Tenaga Rekam Medis dengan Metode Workload Indicator Staffing Need (WISN). *Jurnal Rekam Medik & Manajemen Informasi Kesehatan*, *1*(2), 73–79. https://doi.org/10.47134/rmik.v1i2.20

van den Berg, T. I. J., Elders, L. A. M., de Zwart, B. C. H., & Burdorf, A. (2009). The effects of work-related and individual factors on the Work Ability Index: a systematic review. *Occupational and Environmental Medicine*, *66*(4), 211–220. https://doi.org/10.1136/oem.2008.039883

WHO. (2023). *Workload Indicators of Staffing Need (WISN) User Manual, 2nd edition*. https://www.who.int/publications/i/item/9789240070066

Widowati, V. (2021). An Analysis of Health Human Resources Needs With WISN and ABK Kes Methods. *RA Journal of Applied Research*, *07*(06). https://doi.org/10.47191/rajar/v7i6.07

Yulliswandi, D., Megawati, M., & Nuraini, N. (2022). Nursing Personnel Needs Analysis Using the Workload Indicator Staff Need (WISN) Method in Installation Emergency Datu Beru Hospital Central Aceh. *Journal La Medihealtico*, *3*(4), 249–255. https://doi.org/10.37899/journallamedihealtico.v3i4.689