

TRENDS IN BED OCCUPANCY RATE (BOR) AT SITI AISYAH ISLAMIC HOSPITAL MADIUN 2022-2024: A CRITICAL ANALYSIS OF HOSPITAL SERVICE EFFICIENCY

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ABSTRACT

Objective: This study aims to analyze the BOR trend at Siti Aisyah Islamic Hospital Madiun from 2022 to 2024, compare it with international benchmarks and theoretical standards such as the Barber Johnson theory, and identify internal factors contributing to suboptimal BOR levels.

Methods: This research employed a descriptive quantitative approach using secondary data from internal hospital reports over a three-year period.

Results: BOR values showed a progressive increase: 65.24% in 2022, 66.33% in 2023, and 69.00% in 2024. However, they remained below the Barber Johnson efficiency standard range of 75–85%. Various influencing factors were identified, including nursing service quality, inadequate promotion strategies, and inefficient bed management.

Conclusion: Although an upward trend is evident, BOR at Siti Aisyah Islamic Hospital remains below the ideal level. Strategic interventions are needed to improve inpatient service efficiency.

INFORMASI	ABSTRAK
<p>Korespondensi: offiameldapermata@gmail.com</p> <p>Kata Kunci: <i>Bed Occupancy Rate</i>, Diagram Barber Johnson, efisiensi rumah sakit, mutu pelayanan kesehatan, manajemen pasien</p>	<p>Tujuan: Penelitian ini bertujuan untuk menganalisis tren Bed Occupancy Rate (BOR) di Rumah Sakit Islam Siti Aisyah Madiun selama periode 2022 hingga 2024, membandingkannya dengan tolok ukur internasional dan standar teoretis seperti teori Barber Johnson, serta mengidentifikasi faktor internal yang berkontribusi terhadap tingkat BOR yang belum optimal.</p> <p>Metode: Penelitian ini menggunakan pendekatan deskriptif kuantitatif dengan memanfaatkan data sekunder yang diperoleh dari laporan internal rumah sakit selama tiga tahun terakhir.</p> <p>Hasil: Nilai BOR menunjukkan peningkatan bertahap, yaitu sebesar 65,24% pada tahun 2022, 66,33% pada tahun 2023, dan 69,00% pada tahun 2024. Meskipun demikian, angka tersebut masih berada di bawah standar efisiensi menurut Barber Johnson, yaitu dalam kisaran 75–85%. Beberapa faktor yang memengaruhi diidentifikasi, antara lain mutu layanan keperawatan, strategi promosi yang belum optimal, serta manajemen tempat tidur yang kurang efisien.</p> <p>Kesimpulan: Meskipun terdapat tren peningkatan, BOR di Rumah Sakit Islam Siti Aisyah masih berada di bawah tingkat ideal. Oleh karena itu, diperlukan intervensi strategis untuk meningkatkan efisiensi pelayanan rawat inap.</p>

INTRODUCTION

Bed Occupancy Rate (BOR) is a critical performance metric used to evaluate hospital service efficiency, particularly in the utilization of inpatient facilities. According to the Ministry of Health of the Republic of Indonesia, a BOR of 65% or higher is considered acceptable; however, international standards such as those presented by the Organisation for Economic Co-operation and Development (OECD), an international body that tracks and reports global health system performance, recommend a more optimal BOR range of 75–85% (OECD, 2023).

This broader range reflects a balance between maximizing resource use while avoiding patient overflow that could compromise service quality.

According to the Barber Johnson theory, hospital efficiency is optimized when BOR is maintained between 75% and 85%, accompanied by balanced values of Average Length of Stay (ALOS), Bed Turnover (BTO), and Turnover Interval (TI) (Wardani & Arifin, 2024). A BOR lower than the optimal threshold may suggest issues such as low patient volume, inefficient discharge processes, or weak referral systems, whereas excessively high BOR may strain resources and affect patient outcomes (Bosque-Mercader & Siciliani, 2023).

The Barber Johnson Chart offers a valuable framework to evaluate bed management by integrating BOR with ALOS, TI, and BTO. Optimal performance in these indicators reflects the hospital's ability to manage flow and efficiency.

Persistent BOR levels below the ideal threshold can result in financial inefficiency, wasted resources, and potential delays in patient admissions. Conversely, a BOR that is too high may compromise patient care quality and increase the risk of hospital-acquired infections. Thus, monitoring BOR is crucial to ensuring both service efficiency and patient safety.

RSI Siti Aisyah Madiun, a type C hospital located in East Java, provides various medical services with a capacity of 158 beds. Over the past three years, the hospital has shown progress in patient visits and BOR. However, the values remain below the national and OECD benchmarks, necessitating a deeper investigation into the systemic and strategic factors influencing the hospital's efficiency.

This study aims to analyze BOR trends from 2022 to 2024 and examine internal and external influences using a data-based and literature-supported approach.

METHOD

This study utilizes a descriptive quantitative approach by collecting and analyzing secondary data from hospital reports, covering the period from 2022 to 2024. Key variables include the number of inpatient visits, available beds, and BOR. The

results are presented in tables and compared with benchmarks from OECD data and the Barber Johnson framework.

The objective of this study is to evaluate the effectiveness and efficiency of inpatient bed utilization at RSI Siti Aisyah Madiun over a three-year period by analyzing BOR trends in relation to theoretical benchmarks, particularly the Barber Johnson efficiency range. This analysis is expected to provide a clearer understanding of hospital performance and support recommendations for strategic improvement.

RESULTS

RSI Siti Aisyah Madiun is a type C Islamic general hospital located in East Java, Indonesia, operating with 158 inpatient beds and 359 personnel, including both medical and non-medical staff. The hospital delivers a range of essential and specialized services and has shown steady growth in inpatient service utilization over the past three years.

Table 1. Inpatient Visits at RSI Siti Aisyah (2022–2024)

Year	Inpatient Visits
2022	10,430
2023	11,106
2024	11,651

Table 1 illustrates a consistent upward trend in inpatient visits to RSI Siti Aisyah Madiun from 2022 to 2024. The hospital recorded 10,430 inpatient visits in 2022, which increased to 11,106 in 2023, and further to 11,651 in 2024. This steady growth suggests a rising demand for hospital services, potentially reflecting improved public trust, expanded service reach, or demographic growth in the region.

Table 2. Bed Occupancy Rate (BOR) Trends (2022–2024)

Year	BOR (%)	Barber Johnson Standard (75–85%)	OECD Avg
2022	65.24%	75–85%	74.8%
2023	66.33%	75–85%	75.1%
2024	69.00%	75–85%	75.3%

However, while patient volume increased, the subsequent BOR data in Table 2 indicate that efficiency in bed utilization has yet to reach the ideal standard. BOR remains below the Barber Johnson standard range of 75–85% as well as the

OECD benchmark of 75–77%. This underperformance against both international and theoretical benchmarks highlights inefficiencies in the utilization of inpatient beds. According to the Barber Johnson framework, BOR within the 75–85% range indicates optimal efficiency, balancing capacity and service flow without overloading resources. RSI Siti Aisyah's BOR, while improving annually, still falls short of this ideal and thus warrants attention.

DISCUSSION

Improving BOR is not only a matter of increasing admissions but ensuring that beds are available when truly needed, that discharges are well-timed, and that every hospitalization reflects clinical appropriateness. Continuous interdisciplinary collaboration and integration of smart hospital tools will be essential to bridge the current performance gap.

RSI Siti Aisyah Madiun is a type C Islamic general hospital located in East Java, Indonesia, with a total of 158 beds. It provides essential and specialist services supported by 359 personnel, comprising both medical and non-medical staff. As a faith-based institution, it emphasizes both clinical care and Islamic values in service delivery. Over the last three years, inpatient admissions have increased from 10,430 in 2022 to 11,651 in 2024; however, the efficiency of bed utilization—as reflected by the BOR—has yet to reach optimal levels.

Bed Occupancy Rate (BOR) is a key indicator used to assess hospital performance in terms of efficiency and capacity management. Although BOR at RSI Siti Aisyah Madiun shows an increasing trend over three years, it still falls short of the ideal range suggested by the Barber Johnson standard and OECD average. This indicates that the hospital is experiencing resource underutilization or inefficiencies in patient throughput.

In analyzing the BOR at RSI Siti Aisyah Madiun, it is essential to understand the operational metric underlying this performance indicator. As the hospital has shown improvements in inpatient service volume, the actual occupancy rate remains under the ideal threshold. This reinforces the need to understand how

BOR is quantified, especially in RSI Siti Aisyah Madiun where annual BOR figures remain below ideal thresholds.

The Bed Occupancy Rate (BOR) is commonly calculated using the formula:

$$\text{BOR (\%)} = (\text{Total inpatient days} \div (\text{Number of beds} \times \text{Number of days in period})) \times 100$$

This formula provides a clear quantitative basis for analyzing the extent of hospital bed utilization over a specified time frame. Using this formula and assuming standard operational days and maximum capacity (158 beds \times 365 days), we can estimate the BOR at RSI Siti Aisyah. Based on rough calculations, this results in an estimated BOR of approximately 62.6%, which is relatively close to the hospital's reported figure of 69%. The slight difference may be attributed to daily operational dynamics, such as variations in patient discharge times, the inclusion of specialized units, temporary bed closures due to sterilization procedures or facility maintenance, or fluctuations in the actual average length of stay (Kuntz, Mennicken, & Scholtes, 2015; OECD, 2023).

To reach a 75% BOR, RSI Siti Aisyah would need 41,883 inpatient days, or around 13,961 admissions annually (with 3-day ALOS). The gap of 2,310 patients (~17%) underscores opportunities for efficiency improvement (OECD, 2023). Kuntz et al. (2015) emphasize that consistently high BORs (>85%) can compromise patient safety, increase readmissions, and cause treatment delays. Conversely, BORs below 70%, as seen at RSI Siti Aisyah, signal underutilization. Jones (2023) supports this by asserting that optimal BOR must balance economic efficiency and clinical safety. This validates RSI Siti Aisyah's need to strengthen referral patterns and discharge planning.

Seasonal variation was also evident; hospital reports show patient peaks in October–December, likely influenced by holiday check-ups and insurance use (Tsai et al., 2020). Dynamic bed planning, as advocated by Kim & Oh (2024), could help optimize resources during high-demand months.

The Barber Johnson Chart can be used to monitor BOR alongside ALOS, BTO, and Turnover Interval (TI). Studies in Kediri (Wardani & Arifin, 2024)

demonstrate its effectiveness in improving bed efficiency. RSI Siti Aisyah should adopt this tool for performance benchmarking.

Referral patterns play a vital role. Aloh et al. (2020) found that inefficient referral systems contribute to low BOR in Nigerian hospitals. Similarly, RSI Siti Aisyah must enhance collaboration with upstream providers (e.g., clinics, Puskesmas) to stabilize occupancy levels.

Patient satisfaction also influences BOR. Indarto et al. (2020) show that service quality, especially in nursing, affects patient return rates. Meanwhile, Orlando et al. (2025) found that patients often delay admission due to unsatisfactory primary care experiences, highlighting the need for community trust and accessibility.

From an international perspective, OECD data suggest average BORs of 75–77% in efficient health systems (OECD, 2023). Strategies include digital health records, discharge lounges, and predictive analytics. Pratt & Wood (2021) caution against over-reliance on fixed BOR targets, recommending flexible, real-time resource management.

Further supporting literature offers valuable comparison. Shahu et al. (2022) in a study of rural hospitals in India emphasized the critical role of discharge coordination, staff responsiveness, and real-time monitoring in enhancing BOR. Similarly, Porada et al. (2022) documented that in Poland, alignment of regional referrals and predictive modeling significantly improved hospital occupancy efficiency.

From a theoretical standpoint, Pratt and Wood (2021) urge hospitals not to fixate rigidly on the 85% BOR target, as this may ignore dynamic operational realities. They advocate for adaptive thresholds based on institutional characteristics, which resonates with RSI Siti Aisyah's situation as a type C hospital with seasonal service fluctuations.

As the author, I believe BOR should be interpreted not merely as a number but as a reflection of institutional agility, coordination, and patient-centeredness. Improving BOR is not only a matter of increasing admissions but ensuring that beds are available when truly needed, that discharges are well-timed, and that

every hospitalization reflects clinical appropriateness. Continuous interdisciplinary collaboration and integration of smart hospital tools will be essential to bridge the current performance gap.

To address the suboptimal BOR and improve service efficiency at RSI Siti Aisyah Madiun, several strategic actions are recommended. First, the hospital should implement the Barber Johnson Chart as a routine internal tool to monitor bed utilization, ALOS, BTO, and TI on a monthly basis across all inpatient units. This will provide real-time insights into efficiency and support evidence-based adjustments.

Second, strengthening referral coordination with primary health centers and regional clinics is essential to ensure a steady and appropriate inflow of patients. Establishing standardized referral protocols and communication platforms can improve bed turnover and occupancy consistency.

Third, the adoption of predictive bed management systems using historical occupancy data and seasonal trends can help optimize resource allocation, particularly during peak periods.

Fourth, enhancing the discharge planning process, including early discharge protocols, patient education, and integration with post-discharge services, will help reduce unnecessary bed-days and improve flow.

Lastly, improving community engagement through targeted health promotion campaigns and marketing strategies can raise public awareness and encourage service utilization, especially for elective and planned admissions.

CONCLUSION

The analysis of BOR at RSI Siti Aisyah Madiun from 2022 to 2024 shows steady improvement; however, it still does not meet the theoretical ideal. Despite increasing inpatient admissions, bed utilization remains inefficient when compared to the 75–85% benchmark proposed by Barber Johnson and OECD standards. Comprehensive strategies including referral optimization, discharge planning, and predictive resource allocation are necessary to improve occupancy performance.

REFERENCES

- Aloh, H. E., Aloh, O. G., & Nweke, C. J. 2020. Is bed turnover rate a good metric for hospital scale efficiency? A measure of resource utilization rate for hospitals in Southeast Nigeria. *Cost Effectiveness and Resource Allocation*, 18(1), 16. <https://doi.org/10.1186/s12962-020-00216-w>
- Bosque-Mercader, L., & Siciliani, L. 2023. The association between bed occupancy rates and hospital quality in the English National Health Service. *The European Journal of Health Economics*. <https://doi.org/10.1007/s10198-022-01464-8>
- Castagna, F., Xue, X., Saeed, O., Kataria, R., Puius, Y. A., Patel, S. R., Garcia, M. J., Racine, A. D., Sims, D. B., & Jorde, U. P. 2022. Hospital bed occupancy rate is an independent risk factor for COVID-19 inpatient mortality: A pandemic epicentre cohort study. *BMJ Open*, 12(5), e058171. <https://doi.org/10.1136/bmjopen-2021-058171>
- Ferdinal, D., Defit, S., & Yunus, Y. 2021. Prediksi Bed Occupancy Ratio (BOR) menggunakan metode Monte Carlo. *Jurnal Informasi dan Teknologi*, 3(1). <https://doi.org/10.37034/jidt.v3i1.80>
- Handayani, W. D., Tan, S., Nasution, S. L., & Girsang, E. 2020. Analysis of service factors that influence the bed occupancy rate in the inpatient room of Royal Prima Medan General Hospital. *Jurnal Manajemen dan Pelayanan Kesehatan*.
- Indarto, I., Abdurrouf, M., & Issrovianingrum, R. 2020. Hubungan mutu pelayanan keperawatan dengan bed occupancy rate (BOR) di Rumah Sakit Islam Banjarnegara. *Jurnal Keperawatan*.
- Iskandar, I., Fitriani, A. D., & Asriwati, A. 2021. Determinants influencing bed occupancy rate (BOR) at Langsa hospital in the Covid-19 pandemic. *Journal of Asian Multicultural Research for Medical and Health Science Study*, 2(4). <https://doi.org/10.47616/jamrmhss.v2i4.183>
- Jones, R. P. 2023. Addressing the knowledge deficit in hospital bed planning and defining an optimum region for the number of different types of hospital beds in an effective health care system. *International Journal of Environmental Research and Public Health*, 20(24), 7171. <https://doi.org/10.3390/ijerph20247171>
- Kim, J.-N., & Oh, I.-H. 2024. Optimizing hospital bed capacity and resource allocation using inflow and outflow indices for effective healthcare management. *Inquiry: The Journal of Health Care Organization, Provision, and Financing*. <https://doi.org/10.1177/00469580241304244>
- Kulsum, U., Gunawan, & Ratri, D. R. 2023. Exploring factors behind low bed occupation rate of hospital: A case study. *Jurnal Medicoeticolegal dan*

Manajemen Rumah Sakit, 12(1), 99-106.
<https://doi.org/10.18196/jmmr.v12i1.34>

OECD. 2023. *Health at a glance 2023: Hospital beds and occupancy*. OECD Publishing. https://www.oecd.org/en/publications/2023/11/health-at-a-glance-2023_e04f8239/full-report/hospital-beds-and-occupancy_10add5df.html

Orlando, J. F., Beard, M., Burke, A. L. J., Guerin, M., & Kumar, S. 2025. 'I have never been in that kind of all-consuming pain ... I did not know what else to do': The journey to hospital admission with low back pain from the perspectives of patients. *Health Expectations*, 28(3). <https://doi.org/10.1111/hex.70269>

Porada, S., Sygit, K., Hejda, G., & Nagórska, M. 2022. Optimization of the use of hospital beds as an example of improving the functioning of hospitals in Poland on the basis of the Provincial Clinical Hospital No. 1 in Rzeszow. *International Journal of Environmental Research and Public Health*, 19(7). <https://doi.org/10.3390/ijerph19074140>

Pratt, A. C., & Wood, R. M. 2021. Addressing overestimation and insensitivity in the 85% target for average bed occupancy. *International Journal for Quality in Health Care*, 33(3), mzab100. <https://doi.org/10.1093/intqhc/mzab100>

Purwaningsih, & Yunitasari, E. 2020. Strategi pemasaran peningkatan bed occupancy rate (BOR). *Jurnal Ners*, 15(1).

Shahu, S., Shinde, V., & Gudhe, V. 2020. Analysis of the bed-occupancy, utilization and turnover rate of Acharya Vinoba Bhawe Rural Hospital, India. *International Journal of Health Sciences & Research*.

Surbakti, A. B., & Telaumbanua, S. Y. 2022. Analisis faktor penyebab rendahnya bed occupancy rate (BOR). *Jurnal Manajemen Informasi Kesehatan*, 10(2).

Tsai, J. C.-H., Weng, S.-J., Liu, S.-C., Tsai, Y.-T., Gotcher, D. F., Chen, C.-H., Chou, C.-A., & Kim, S.-H. 2020. Adjusting daily inpatient bed allocation to smooth emergency department occupancy variation. *Healthcare*, 8(2), 78. <https://doi.org/10.3390/healthcare8020078>

Wardani, R., & Arifin, Z. 2024. Optimization of the use of the Barber Johnson chart on the efficiency of bed management in the Kabupaten Kediri Hospital. *Journal of Community Engagement in Health*, 7(2), 158-169. <https://doi.org/10.30994/jceh.v7i2.572>

Wulandari, E., & Handayani, T. 2021. Pengaruh sistem rujukan terhadap bed occupancy rate di rumah sakit umum daerah. *Jurnal Administrasi Kesehatan Indonesia*, 9(2), 55-61.