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FACTORS CONTRIBUTING TO THE DECLINE IN BED OCCUPANCY RATE IN THE NEONATAL INTENSIVE CARE UNIT OF NGIMBANG REGIONAL GENERAL HOSPITAL, LAMONGAN

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Abstract:

Background: Bed occupancy rate (BOR) is an indicator of inpatient-bed utilization and hospital efficiency. The Neonatal Intensive Care Unit (NICU) of Ngimbang Regional General Hospital experienced a substantial decline in BOR, requiring an examination of internal management and external service factors.

Objective: To analyze factors contributing to the decline in BOR in the NICU of Ngimbang Regional General Hospital using the Input–Process–Output (IPO) framework. Methods: This descriptive qualitative study was conducted at Ngimbang Regional General Hospital, Lamongan, from December 2025 to July 2026. Five informants were purposively selected: the NICU head, a service-management staff member, a marketing staff member/editor, a parent of a BPJS-insured infant, and a parent of a general-pay patient. Data were collected through in-depth interviews, observation, and document review, and analyzed using the Miles and Huberman model.

Results: The input findings indicated that human resources, tariffs, and facilities generally supported NICU services. The factors identified as contributing to lower BOR were the reduced number of maternity referrals and deliveries, as well as community preference for a particular obstetrician–gynecologist. Process-related findings included coordination and administrative-document delays, while monitoring and recording of the "5 in 1 Bayi Lawas Aku Foto" program were not fully integrated. Document review showed that monthly BOR declined from 95% in January 2026 to 26% in June 2026, falling below the stated 60–85% benchmark from March onward.

Conclusion: The decline in NICU bed utilization is influenced by referral patterns, patient provider preferences, and administrative coordination factors. Strengthening inter-facility referral engagement, cross-unit communication, and integrated monitoring effectively supports service utilization and optimizes inpatient care management.

Keywords: Bed occupancy rate; hospital management; input–process–output; neonatal intensive care unit; referral system

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1. INTRODUCTION

Hospitals are expected to deliver comprehensive, high-quality, effective, and efficient health services. One indicator commonly used to assess inpatient-bed utilization is the bed occupancy rate (BOR), which represents the proportion of available bed-days occupied by patients during a

specified period (Yuniawati et al., 2021). The source manuscript refers to an ideal BOR range of 60–85%, while a low value may indicate underutilization of inpatient capacity and the need to review service and management factors (Sihombing, 2024).

The NICU of Ngimbang Regional General Hospital (RSUD Ngimbang), Lamongan, experienced a decline in annual BOR from 67.39% in 2023 to 60.75% in 2024 and 35.24% in 2025. This downward trend suggests that NICU bed utilization had fallen below the benchmark cited in the source manuscript. The issue is important because NICU utilization is influenced not only by the availability of clinical resources but also by referral pathways, maternity-service volume, patient preferences, and the coordination of hospital processes.

The source manuscript applies an Input–Process–Output (IPO) perspective to examine these issues. Input factors include human resources, tariffs, referral policies, facilities, and market conditions. Process factors include planning, organizing, actuating, and controlling. Previous research has associated BOR variation with internal and external hospital factors (Gustomi et al., 2023), while service quality has also been discussed as a potential strategy for improving bed utilization (Indarto, 2023).

At RSUD Ngimbang, preliminary observations highlighted a reduction in referrals and maternity cases, partly because some conditions could be managed at primary healthcare facilities. The hospital had also introduced the "5 in 1 Bayi Lawas Aku Foto" service innovation, intended to improve service experience and support hospital promotion. However, the contribution of referral patterns, patient preferences, and the implementation of this program to NICU utilization had not been examined together in the local setting.

This study therefore aimed to analyze factors contributing to the decline in BOR in the NICU of Ngimbang Hospitalusing the IPO framework. The analysis focused on the input, process, and output components and was intended to identify operational areas that may require improvement.

2. MATERIAL AND METHODS

2.1 Research Design

This study used a descriptive qualitative design. The IPO framework was used to organize the analysis of input resources and market conditions, management processes, and NICU BOR as the output indicator.

2.2 Research Population and Sample

The study involved five informants selected through purposive sampling: (1) the NICU head, (2) service-management staff, (3) marketing staff/editor, (4) a parent of an infant covered by BPJS Health insurance, and (5) a parent of an infant receiving services as a general-pay patient. The informants were selected because they were considered able to provide information relevant to NICU services and the hospital's service processes.

2.3 Research Setting and Time

The study was conducted at the NICU of Ngimbang Regional General Hospital, Lamongan, East Java, Indonesia. The stated research period was December 2025 to July 2026.

2.4 Research Procedures

Data collection involved in-depth interviews with the selected informants, observation of relevant NICU and administrative processes, and review of hospital documents. The inquiry was organized around the IPO components: human resources, tariffs, referral policy, facilities, and market factors under input; planning, organizing, actuating, and controlling under process; and BOR under output.

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2.5 Data Collection Techniques

The study used three data sources: in-depth interviews, direct observation, and document review. Interviews provided information on staff competence, tariffs, referral practices, patient choice, coordination, and implementation of the "5 in 1 Bayi Lawas Aku Foto" program. Observation was used to assess the availability of general and medical facilities. Document review provided the reported BOR values and information on program administration and recording.

2.6 Research Instruments

Data collection was conducted through in-depth interviews, direct observation, and document review based on an operational framework linking Input-Process-Output (IPO) sub-variables, indicators, and measurement methods. The interview protocols and document review instruments were structured systematically around the indicators defined within this operational framework.

2.7 Data Analysis

Qualitative data were analyzed using the Miles and Huberman interactive model, comprising data collection, data reduction, data display, and conclusion drawing/verification (Zulfirman, 2022). Interview, observation, and document-review findings were organized according to the IPO framework. The monthly BOR values were summarized descriptively to show the trend from January to June 2026.

2.8 Scope and Limitations

The study was limited to the NICU of one regional general hospital and five purposively selected informants. Its findings describe the local context and should not be generalized automatically to other hospitals. The qualitative design supports an in-depth description of perceived and operational factors but cannot quantify the independent contribution of each factor to BOR. The document-based BOR trend is limited to the periods reported in the manuscript.

2.9 Ethical Considerations

This qualitative study was conducted in strict compliance with research ethics and institutional governance standards. Prior to data collection, administrative approval and research authorization were secured from the management of Ngimbang Hospital. Informed consent was obtained from all participating informants including the head of the NICU, healthcare service staff, marketing staff, and patients' parents after providing a thorough explanation of the research objectives, procedures, voluntary nature of participation, and confidentiality assurances. All informants willingly agreed to participate and signed the informed consent forms. To protect participant privacy and data confidentiality, all interview records and transcripts were securely stored and anonymized.

3. RESULTS AND DISCUSSION

3.1. Result

The findings are presented according to the IPO framework. Five informants participated, representing NICU management, service management, marketing, and two service-user perspectives. Table 1 summarizes the operational indicators and the data-collection sources described in the manuscript.

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Table 1. Operational Framework and Data-Collection Sources

Component	Indicator	Sub-indicator	Data source
Input	Man	Staff competence	Interview; document review
Input	Money	Hospital tariffs for patients	Interview; document review
Input	Method	Referral policy/system	Interview; document review
Input	Material	General and medical facilities	Interview; observation
Input	Market	Socioeconomic status, distance, transport, motivation toward hospital	Interview
Process	Planning	Objectives and procedures	Interview; document review
Process	Organizing	Departmentalization/task allocation	Interview
Process	Actuating	Communication	Interview
Process	Controlling	Reporting and recording	Interview; document review
Output	BOR achievement	Percentage of bed utilization	Document review

3.1.1 Input Component

Man (staff competence). Staff competence in the NICU was generally considered adequate. The manuscript reports no identified errors in examinations or medical procedures, good communication with families, and participation by most staff in NICU or neonatal-resuscitation training. However, some newly recruited staff had not completed all relevant training, indicating a need for more even distribution of training opportunities. Overall, staff competence was not identified by the informants as a principal explanation for the declining BOR.

Money (tariffs). Tariffs were reported to follow the applicable payment arrangements: INA-CBGs for BPJS-insured patients and the Lamongan Regent Regulation No. 96 of 2016 for general-pay patients. Previous BPJS claim difficulties were described as relating to coverage limits rather than the hospital's tariff-setting process. Informants indicated that service quality and hospital location were more influential in patient choice than tariffs. Accordingly, tariffs were not identified as a main factor contributing to the decline.

Method (referral policy). Referrals were processed through the Integrated Referral System (Sisrute), and the manuscript reports no refusal of BPJS patients in the NICU. Nevertheless, the relatively small number of maternity referrals to Ngimbang Hospitalcontributed to fewer infants potentially requiring NICU care. Some cases could be managed at primary healthcare facilities and therefore did not require hospital referral. The manuscript also reports a tendency for some healthcare professionals to refer patients to hospitals where they practice. Reduced maternity referrals were therefore identified as an important factor associated with lower NICU utilization.

Material (facilities). General and medical facilities were considered broadly adequate, including the treatment room, cleanliness, lighting, ventilation, incubators, and other supporting medical equipment. The absence of a dedicated family waiting

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room and the lack of weather protection in the parking area were noted as areas for improvement, but were not considered by informants to explain the decline in BOR.

Market (patient and community factors). Socioeconomic status, distance, and transportation were not identified as the main barriers to NICU use. Most patients were described as belonging to lower- to middle-income groups and using BPJS, while access and transportation were generally considered manageable. A more prominent factor was patient preference for a particular obstetrician–gynecologist. Following a change in the specialist, the number of deliveries at Ngimbang Hospitalreportedly decreased, reducing the number of newborns who might require NICU care.

3.1.2 Process Component

The "5 in 1 Bayi Lawas Aku Foto" program was structured with defined objectives, targets, and operational procedures aimed at enhancing service quality, introducing healthcare innovation, and serving as a promotional medium. Implementation encompassed administrative processing and infant photography involving multiple hospital units. However, operational evaluation revealed that the planning phase encountered practical challenges, specifically delays in issuing infant administrative documents (such as family cards, child identity cards, and birth certificates) and occasional miscommunication across participating units, which subsequently impacted overall execution efficiency.

Organizing. Task allocation among units was described as clear. NICU staff provided information and took infant photographs; the marketing team edited and distributed the photographs; and administrative services involved the service unit, general affairs, and the civil registration office (Disdukcapil). Coordination was conducted through WhatsApp and email.

Actuating. Communication between staff and patients' families was reported to be satisfactory. Families were informed about the program while the infant was receiving NICU care, and staff explained the available facilities and program requirements. Digital communication also supported coordination among staff.

Controlling. Monitoring and recording were not fully integrated across all units. There was no dedicated monitoring system to identify patients who had or had not completed all stages of the program. The manuscript also reports delayed documents, photographs not collected by families, and photographs that were missed during processing. These findings indicate that program monitoring, documentation, and follow-up require improvement.

3.1.3 Output Component

The output component was assessed using NICU BOR. Document review showed a consistent decline between January and June 2026, as presented in Table 2.

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Table 2. Monthly Bed Occupancy Rate in the NICU, January–June 2026

Month	BOR	Reference range
January	95.00%	60–85%
February	87.00%	60–85%
March	57.00%	60–85%
April	55.00%	60–85%
May	40.00%	60–85%
June	26.00%	60–85%

BOR decreased from 95% in January to 26% in June 2026. The value was above the stated reference range in January and February, then fell below the lower reference limit from March through June. This pattern indicates a marked reduction in NICU bed utilization during the six-month period.

Table 3. Annual Bed Occupancy Rate by Hospital Ward, 2023–2025

Ward	2023	2024	2025	Reference range
Graha	58.44%	70.19%	56.43%	60–85%
Anggrek	92.49%	93.22%	85.46%	60–85%
Anggrek Anak	63.94%	75.54%	27.94%	60–85%
Flamboyan	84.51%	92.95%	64.83%	60–85%
ICU	25.49%	48.22%	42.14%	60–85%
NICU	67.39%	60.75%	35.24%	60–85%
Nifas	46.62%	48.52%	28.31%	60–85%

The hospital-wide comparison in Table 3 shows that NICU BOR declined from 67.39% in 2023 to 35.24% in 2025. Declines were also reported in several other wards, including Anggrek Anak, ICU, and Nifas, suggesting that the issue may not be exclusive to the NICU.

3.2 Discussion

The findings indicate that the decline in NICU BOR is better understood as a combination of external demand-side factors and internal process-management issues, rather than a shortage of clinical resources alone. The IPO framework helped distinguish inputs that were generally considered adequate from referral and market factors that influenced the number of infants potentially requiring NICU admission.

3.2.1 Input Factors

Human resources, tariffs, and facilities were generally reported to support NICU services. Although training coverage among newer staff should be strengthened, staff competence was not identified as the main factor behind the BOR decline. This is consistent with the competency perspective cited in the source manuscript, which emphasizes education and training as foundations for work performance (Yulinda, 2016). The findings also suggest that tariff arrangements were not the primary barrier to service use, consistent with the cited discussion by Rochmiati et al. (2021) that patient choice may be shaped by factors beyond price, including service quality.

The referral and market findings were more directly related to the reduction in potential NICU admissions. When deliveries at the hospital decline, the pool of newborns who may require intensive neonatal care can also decrease. In addition,

appropriate referral systems should be based on clinical need and the capacity of the referring facility. The manuscript cites Minister of Health Regulation No. 16 of 2024 in relation to individual healthcare referral arrangements. The reported preference for a particular obstetrician–gynecologist may also influence the choice of maternity facility and, indirectly, the number of newborns requiring NICU services. Similar patient trust and provider preference considerations are discussed in the cited study by Mellenia and Ardi (2025).

The facilities finding is consistent with the view that adequate medical equipment and infrastructure support effective service delivery (Sikki et al., 2025). However, adequate facilities alone may not ensure high bed utilization when patient inflow is low. This distinction is important: capacity readiness and service demand are related but different dimensions of hospital performance.

3.2.2 Process Factors

The implementation of the "5 in 1 Bayi Lawas Aku Foto" program demonstrated structured objectives, clear departmental role allocation, and effective communication between medical officers and patient families, reflecting established management principles regarding planning, organizing, and actuating (Hasanah et al., 2022; Yulianto, 2018; Rachmayuniawati, 2018). However, evaluation across administrative workflows revealed primary operational weaknesses in the controlling stage, specifically manifested as unintegrated record-keeping across units, sporadic administrative delays in issuing infant documents, and occasional gaps in program tracking. Strengthening cross-unit monitoring and establishing synchronized documentation protocols are essential to optimize service execution and accountability.

3.2.3 Output and BOR Trend

The monthly BOR trend showed a decline from 95% in January to 26% in June 2026, with values below the cited 60–85% reference range from March onward. This pattern is consistent with the annual reduction from 67.39% in 2023 to 35.24% in 2025. BOR is a utilization indicator and should be interpreted alongside patient volume, available bed capacity, length of stay, case mix, referral patterns, and service readiness. The current qualitative study identifies plausible operational and demand-related explanations but does not quantify their individual effects.

3.3 Implications

Hospital management should strengthen communication with referring primary healthcare facilities and clarify referral coordination while ensuring that all referrals remain clinically appropriate. The hospital may also review maternity-service access and continuity arrangements, including how changes in specialist availability are communicated to the community. Internally, the "5 in 1 Bayi Lawas Aku Foto" program should use integrated documentation and monitoring to reduce incomplete administrative processes.

3.4 Research Contribution

This study contributes a local qualitative account of NICU utilization by combining referral and patient-choice factors with internal management processes under an IPO framework. It highlights that adequate staff, tariffs, and facilities may coexist with low BOR when the volume of potential admissions declines and program monitoring is not fully integrated.

3.5 Limitations

The study involved five purposively selected informants at a single hospital, limiting transferability. The findings rely on qualitative accounts and document review; no quantitative analysis was conducted to estimate the association between each identified factor and BOR.

3.6 Suggestions

Ngimbang Hospitalshould establish routine monitoring of referral sources, maternity-delivery volume, NICU admissions, bed availability, and BOR, while maintaining clinical appropriateness in referral decisions. The hospital should strengthen partnerships and feedback mechanisms with primary healthcare facilities, ensure continuity of maternity-service information, and introduce an integrated checklist or digital register for every stage of the "5 in 1 Bayi Lawas Aku Foto" program. Future research should include more diverse informants, direct interview excerpts, transparent qualitative coding, and quantitative trend or case-mix analysis to examine the relationship between referral volume, deliveries, NICU admissions, and BOR.

4. CONCLUSION

The decline in NICU BOR at Ngimbang Hospitalwas associated in the qualitative findings with a reduction in maternity referrals and deliveries, as well as community preference for a particular obstetrician–gynecologist. Human resources, tariffs, and medical facilities were generally considered adequate. Within the service process, the most clearly documented weakness was incomplete integration of recording and monitoring for the "5 in 1 Bayi Lawas Aku Foto" program; administrative delays and inter-unit communication issues also require clarification and consistent documentation. NICU BOR declined from 95% in January 2026 to 26% in June 2026 and remained below the cited 60–85% range from March onward. These findings support improvements in referral coordination and process monitoring but do not establish causal effects.

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AUTHOR CONTRIBUTIONS STATEMENT

All authors contributed to the conception and design of the study, data collection, data analysis, interpretation of the results, and manuscript preparation. All authors reviewed, revised, and approved the final version of the manuscript and agreed to be accountable for the integrity and accuracy of the work.

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