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Factors Influencing the Utilization of Inpatient Units: Demand, Provision and Policies Comprehensively in Literature Review

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ABSTRACT
The 2023 expansion of Indonesia's National Health Insurance (JKN) to 95.2% coverage and the rising burden of non-communicable diseases have driven increases in patient length of stay and inpatient visits, yet hospital bed distribution remains uneven across provinces, causing patient backlogs and delays in critical care. To comprehensively review demand, supply, and policy factors affecting inpatient unit utilization, measured by the Bed Occupancy Rate (BOR), in literature published from 2020 to 2025. A Literature Review was conducted using the PEOS framework (Patient, Exposure, Outcome, Studies). Articles were sourced from Science Direct, SpringerLink, and ProQuest, followed by deduplication, title/abstract screening, and full-text selection based on inclusion-exclusion criteria. The PRISMA flowchart guided the screening process to ensure alignment with PEOS. Out of 57 identified articles, 20 met the criteria for full analysis. Findings indicate that patient demand, bed supply capacity, and financing and referral policies significantly influence BOR. However, no study was found that integrates all three aspects comprehensively. Demand, supply, and policy are key determinants of hospital bed utilization. Further research examining their interactions is needed to develop strategic recommendations for capacity management and equitable access to inpatient services.
Keywords: inpatient utilization, Bed Occupancy Rate, demand, supply, policy

INTRODUCTION

In 2023, the increase in National Health Insurance (JKN) which reached 95.2% of the population (267.3 million people) and the increase in the burden of non-communicable diseases have driven a surge in the need for hospitalization, as seen from the increase in the average length of patient stay (*bed-day demand*) and the number of hospital visits. But on the other hand, disparity in service access still poses a real problem. Although the national bed ratio reached 1.38 per 1,000 population, exceeding WHO standards, some provinces such as Central Papua (0.7/1,000) and Mountainous Papua (0.4/1,000) are still well below the minimum threshold, triggering patient queues and potential delays in critical medical services[1].

Meanwhile, the addition of massive facilities and beds without an integrated distribution strategy can lead to under-optimization of resources. Excess capacity in urban areas that are already relatively dense and shortages in remote areas result in *underutilization* and *overutilization* Simultaneously. This imbalance not only affects the hospital's performance in meeting service standards, but also impacts operational efficiency, treatment costs, and patient satisfaction which are important indicators in service quality assessment[1].

Policies such as the 2020–2024 RPJMN which targets 100% hospital accreditation and health facility classification regulations provide a framework for improving the quality and capabilities of infrastructure. But without a deep understanding of the interaction between demand (*Demand*), preparation (*Supply*), and policies (*Stuart T*) to the level of bed occupancy (*Bed occupancy rate*), government efforts risk not being on target[1]. Therefore, research that comprehensively examines the relationship between these three factors is absolutely necessary to formulate strategic recommendations for more optimal bed allocation, reduce access inequalities, and improve the quality of inpatient services in general.

RESEARCH METHODS

Literature Review is a method used with sources in the form of an open access journal database consisting of *Science Direct, Spingerlink* and *ProQuest.* The research begins by establishing the PEOS formula. P (*patient*) is an inpatient of the hospital. E (*exposure*) is the level of patient demand, hospital supply capacity, and policy. O (*outcome*) is the utilization of inpatient units in *bed occupancy rate* (BOR). S (*studies*) is a quantitative, qualitative and theoretical review study. After that, restrictions were made with inclusion and exclusion criteria. The research inclusion criteria include journal articles and the year 2020-2025 that can be accessed in *full text*, as well as *peer reviewed*. The languages used are English and Indonesian. Meanwhile, the criteria for research exclusion include *grey literature*, proceedings, *nonpeer review*, and *clinical research*. In addition, research on non-inpatient units including critical *care*, *emergency rooms*, *operating rooms*, laboratories and outpatient units, research on purely clinical studies without anything to do with utilization is also excluded.

The author checks duplication and then feasibility with titles, abstracts and compatibility with PEOS assisted by the Mendeley Desktop application. The author also extracted the article to find out the suitability of the content with PEOS. After that, the author presented the data with PRISMA.

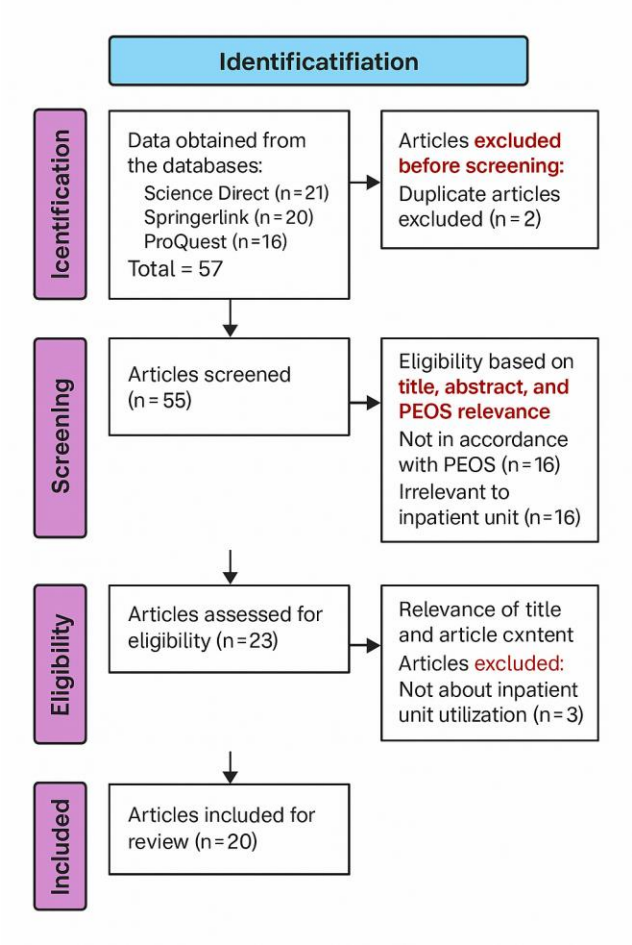

Figure 1. Diagram PRISMA

(Source: Author's Construction, Year 2025)

RESULTS AND DISCUSSION

The results of the literature search in the form of electronic journals were 57 articles according to the keywords used. A total of 20 articles have been screened based on the inclusion and exclusion criteria of research using the PRISMA technique.

Table 1. Summary of Literature Findings

Heading	Writer	Journal Name, Year, Vol, No	Summary
An Optimization Model and Computer Simulation for Allocation Planning of Hospital Bed Resources[2]	Qingyuan Xue, Yancun Fan, Junjie Wang, Yuanyuan Kuang, Yingsong Chen	*Mathematical Problems in Engineering*, 2022, Vol. 2022, No. 3469641	Request: Patient awareness for hospitalization. Provision: Lack of beds, lack of medical resources, waste in medical care, tension

Heading	Writer	Journal Name, Year, Vol, No	Summary
			between doctors and patients. Policy: The Chinese government implements the MATLAB program in government hospitals to establish a bed allocation system according to specific conditions, disease waiting times and other factors to improve service capabilities, reduce patient waiting times, and save health resources.
Development of a model for predicting hospital beds shortage and optimal policies using system dynamics approach[3]	Seyede Maryam Najibi, Seyed Hosein Seyedi, Payam Farhadi, Erfan Kharazmi, Payam Shojaei, Sajad Delavari, Farhad Lotfi, Zahra Kavosi	*BMC Health Services Research*, 2022, Vol. 22, No. 1525	Policy: The Iranian government uses system dynamics to intervene in improving the allocation of government hospital beds by increasing the number of beds and increasing the number of home care services at the same time.
Economic Analysis of Portuguese Public Hospitals Through the Construction of Quality, Efficiency, Access, and Financial Related Composite Indicators[4]	Rita Matos, Diogo Ferreira, Maria Isabel Pedro	*Social Indicators Research*, 2021, Vol. 157, No. 361-362	Provision: The utilization of inpatient units in Portuguese government hospitals is influenced by the four dimensions of access, efficiency and productivity, finance, and quality.
Estimating the Unit Costs of Healthcare Service Delivery in India: Addressing Information Gaps for Price Setting and Health Technology Assessment[5]	Pankaj Bahuguna, Lorna Guinness, Sameer Sharma, Akashdeep Singh Chauhan, Laura Downey, Shankar Prinja	*Applied Health Economics and Health Policy*, 2020, Vol. 18, No. 699-711	Provision: Adapted from the WHO method used to estimate the cost function in the care system, there is significant variation in unit cost and wage between government hospitals and private hospitals both

Heading	Writer	Journal Name, Year, Vol, No	Summary
			between states and at the health system level.
Evaluating the comparative efficiency of medical centers in Taiwan: a dynamic data envelopment analysis application[6]	Cheng-Ming Chiu; Ming-Shu Chen; Chung-Shun Lin; Wei-Yu Lin; Hui-Chu Lang	*BMC Health Services Research*, 2022, Vol. 22, No. 435	Policy: Taiwan's national health insurance affects the efficiency variations of government and private hospitals. The utilization of inpatient units is an indicator of efficiency.
Evaluation of the National Health Insurance Program of Nepal: are political promises translated into actions?[7]	Geha N. Khanal; Bishal Bharadwaj; Nijan Upadhyay; Tulasi Bhattarai; Minakshi Dahal; Resham B. Khatri	*Health Research Policy and Systems*, 2023, Vol. 21, No. 7	Policy: Comprehensive reforms are needed in the form of amendments to the law to simplify the registration and selection mechanism *for first service points* (FSPs), digitization of the claims and reimbursement processes, integration of fragmented financing schemes into a single fund, and the implementation of *targeted cost-sharing* to control moral hazards and ensure financial sustainability.
Exploring the risks of fragmentation in health care markets – An analysis of inpatient care in Georgia[8]	Mari Tvaliashvili; Lela Sulaberidze; Catherine Goodman; Kara Hanson; George Gotsadze	*Social Science & Medicine*, 2024, Vol. 362, No. 117427	Demand: Georgian society is experiencing a weak economy. Provision: Private hospitals have few facilities, none of which are complete, but have an effect on the inpatient market of Gerogia; the distribution of health workers is uneven. Policies: no policies govern yet.
Facilitators and barriers to participation of the	Harsh S. Dave; Jay R. Patwa; Niraj B. Pandit	*Clinical Epidemiology and Global Health*,	Policy: Most private hospitals in India do not participate in the national Health

Heading	Writer	Journal Name, Year, Vol, No	Summary
private sector health facilities in health insurance & governmentled schemes in India[9]		2021, Vol. 10, No. 100699	insurance scheme due to low and delayed claim payments, limited coverage of Healthcare services in the national Health scheme, high administrative burden for claim submission and verification and lack of understanding of terms and policies.
Factors associated with patients' mobility rates within the provinces of Iran[10]	Somayeh Noori Hekmat; Ali Akbar Haghdoost; Zahra Zamaninasab; Rohaneh Rahimisadegh; Fatemeh Dehnavieh; Samira Emadi	*BMC Health Services Research*, 2022, Vol. 22, No. 1556	Demand: Patients prefer to be treated in the city because they feel that specialist services in the area are inadequate. Policy: There is no national referral system policy and patients are free to choose hospitals in Iran.
Hospital reimbursement and capacity constraints: Evidence from orthopedic surgeries[11]	Ingrid Huitfeldt	*Health Policy, 2021*, Vol. 125, No. 732-738	Policy: Changes in the rate scheme in Norway did not provide a significant difference in response, either in terms of the magnitude of the rate change or in terms of bed occupancy rates for orthopaedic patients before and after the implementation of *the Diagnosis Related Group* (DRG).
Identifying and prioritizing inefficiency causes in Iran's health system[12]	Alireza Olyaeemanesh, Farhad Habibi, Mohammadreza Mobinizadeh, Amirhossein Takian, Bahman Khosravi, Jawad Jafarzadeh,	*Cost Effectiveness and Resource Allocation*, 2024, Vol. 22, No. 81	Provision: Imbalance in the number and distribution of hospital beds, *overuse* of health services and medicines, and suboptimal management of human resources in Iran. Policy: Improving management, redistributing

Heading	Writer	Journal Name, Year, Vol, No	Summary
	Ahad Bakhtiari, Efat Mohamadi		resources, strengthening referral systems, and implementing evidence-based management practices need to be policy priorities to improve efficiency, effectiveness, and equitable access to health services.
Improving public hospital efficiency and fiscal space implications: the case of Mauritius[13]	Ajoy Nundoochan	*International Journal for Equity in Health*, 2020, Vol. 19, No. 152	Provision: The distribution of the number of beds is balanced as needed. Policy: There is no referral system yet, the government has used the DRG payment system.
Is bed turnover rate a good metric for hospital scale efficiency? A measure of resource utilization rate for hospitals in Southeast Nigeria[14]	Henry E. Aloh, Obinna E. Onwujekwe, Obianuju G. Aloh, Chijioke J. Nweke	*Cost Effectiveness and Resource Allocation*, 2020, Vol. 18, No. 21	Provision: Inefficiencies in the utilization of resources can be seen from the low bed occupancy rate, the length of patient care, and the low rate of bed turnover in Southeast Nigeria Education hospitals.
Levels, trends and determinants of technical efficiency of general hospitals in Uganda: data envelopment analysis and Tobit regression analysis[15]	Rogers Ayiko, Paschal N. Mujasi, Joyce Abaliwano, Dickson Turyareeba, Rogers Enyaku, Robert Anguyo, Walter Odoch, Pauline Bakibinga, Tom Aliti	*BMC Health Services Research*, 2020, Vol. 20, No. 916	Provision: Variations in performance between hospitals such as hospital size, geographical location, status of government hospitals and private nonprofit hospitals in Uganda as well as inefficiencies in length of care.
Long-term projections of health care funding, bed capacity and workforce needs in England[16]	Laurie Rachet-Jacquet, Stephen Rocks, Anita Charlesworth	Health Policy, 2023, Vol. 132, No. 104815	Demand: The demand for healthcare services is increasing due to the increasing aging rate and morbidity of the population. Provision: Addition of government hospital beds in

Heading	Writer	Journal Name, Year, Vol, No	Summary
			the UK and improvement of the performance of medical personnel, improvement of productivity and improvement of care models such as reduction of length of stay and improvement of outpatient services
Models and methods for determining the optimal number of beds in hospitals and regions: a systematic scoping review[17]	Hamid Ravaghi, Saeide Alidoost, Russell Mannion, Victoria D. Bélorgeot	*BMC Health Services Research*, 2020, Vol. 20, No. 186	Demand: Demographics, patient mobilization. Provision: Geographic distribution, clinical utilization patterns. Policy: Strategic planning, a policy that emphasizes reducing the need for hospitalization through strengthening primary care and health promotion.
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[18]	Sławomir Porada, Katarzyna Sygit, Grażyna Hejda, Małgorzata Nagórska	*International Journal of Environmental Research and Public Health*, 2022, Vol. 19, No. 5349	Provision: Poland lowered the number of beds in line with the decrease in service demand without lowering the BOR, increasing per-bed funding for quality improvement and meeting the ratio of medical personnel per bed.
The association between bed occupancy rates and hospital quality in the English National Health Service[19]	Laia Bosque-Mercader and Luigi Siciliani	*The European Journal of Health Economics*, 2023, Vol 24, no 209–236	Provision: High levels of BOR are associated with a decline in the quality of hospital services in both government and private hospitals in the UK.
The effect of an innovative payment method on inpatient volume and bed	Kunhe Lin, Yifan Yao, Yingbei Xiong, and Li Xiang	*International Journal for Equity in Health*, 2024, Vol 23, No. 159	Policy: The DIP (*Diagnosis-Intervention Pocket*) payment method policy has reduced the volume of

Heading	Writer	Journal Name, Year, Vol, No	Summary
resources and their regional distribution: the case of a central province in China[20]			inpatients, lowering the length of stay in primary and rural hospitals. However, secondary and tertiary hospitals continue to accept more patients.
The health cost of reducing hospital bed capacity[21]	Jonathan Siverskog, Martin Henriksson	*Social Science & Medicine*, 2022, Vol. 313, No. 115399	Policy: Reduced healthcare costs result in a reduction in hospital beds in Sweden.

Source: Secondary Data, 2025

Of the 20 findings of the article obtained, it has indeed researched the utilization of inpatient units with the unit of measurement being the Bed occupancy ratio (BOR). Above there is also research on the demand, supply, and policies of each country studied. However, no articles were found that discussed the demand, provision and policies for the utilization of inpatient units comprehensively.

Discussion

One measure of hospital performance is bed occupancy (*bed occupancy ratio* / BOR) in percent units. BOR has a formula[22]:

$$\text{BOR formula} = \frac{\text{Number of days hospitalized}}{\text{(Number of days in a period x number of beds)}} \text{ X } 100\%$$

This occupancy will indicate the utilization rate of the inpatient unit. The utilization of inpatient units is influenced by many factors. However, the author only limits the factors of demand, *supply* and policy in this *literature review*.

Demand

The demand for health services affects hospital visits. Increased hospital visits will affect bed occupancy rates. Among them is increased awareness to be hospitalized when sick[2] and the increasing demand for health services due to the increasing ageing rate and morbidity of the population clearly increases the utilization of inpatient units[16]. Personal requests of patients such as patients prefer to be treated in the city because they feel that specialist services in the area are inadequate. This makes the mobilization of patients which ultimately makes the utilization of hospital beds in the city exceed its capacity, while in the regions there is a decrease in bed utilization[1017]. On the other hand, the weak economic situation will also affect the number of hospital visits, moreover the high cost of hospitalizations[8]. In addition, external factors such as demographic distribution indirectly affect the hospital's BOR[17].

Provision

The provision of health services is also no less important in determining the occupancy rate of inpatient units. Patients have the right to choose where they will be treated, making the hospital try to meet the services according to the patient's expectations. Utilization of hospitalizations is an indicator of efficiency[6]. Among them are the number and distribution of hospital beds, the distribution of health workers, medical resources, efficiency and effectiveness in medical care, the relationship between doctors and patients, the use of health services and medicines, and the management of human resources affect the rate of patient visits to hospitals which ultimately affects the bed occupancy rate[281213]. If there is no balance between demand and supply, inefficiency will occur. Inefficiencies in the utilization of resources can be seen from the low occupancy rate, the length of patient care, and the low rate of bed turnover in teaching hospitals[14].

The utilization of inpatient units that are not optimal can also be influenced by variations in performance between hospitals such as hospital size, geographical location, the status of government and private nonprofit hospitals, and inefficiency in the length of treatment[15]. The addition of government hospital beds and improved performance of medical personnel, improved productivity and improvement of care models such as reduction in length of stay and improvement of outpatient services affect the utilization of inpatient services[1617]. Clinical utilization patterns in hospital management affect bed occupancy rates[17]. In addition, it can also restructure government hospitals with the result of reducing beds in accordance with the decrease in service demand without lowering the BOR. On the other hand, increasing funding per bed to improve the quality and fulfillment of the ratio of medical personnel per bed so that it can improve the efficiency and operational effectiveness of hospitals without sacrificing access and quality of patient services[18]. High BOR levels are linked to a decline in the quality of hospital services in both government and private hospitals in the UK[19].

Inpatient unit utilization can also be influenced by the four dimensions of access, efficiency and productivity, finance, and quality. In the financial dimension, if government hospitals are still thinking of not being profit-oriented entities, it will result in a decrease in patient visits, thereby reducing the number of bed occupancy which ultimately decreases revenue. The efficiency and productivity dimensions indicate whether there is any indication of resource wastage, including beds. Even if beds are available, they can still be increased to reduce costs and increase service capacity without significantly increasing the number of beds[4].

Adaptations of the WHO method can also be used to estimate the cost function in the care system. Statistically, there are significant variations in unit costs and wages between government hospitals and private hospitals, both between states and at the health system level. This also has an impact on inpatient services[5].

Developing countries have the characteristic of having a higher proportion of private hospitals than government hospitals. Private hospitals have few facilities, none are complete, but can Influence on the Inpatient Market[8]. Ultimately there is no standard model or method for determining the optimal number of hospital beds[17].

Policy

Health policy (*Health Policy*)) at the macro, meso and micro levels will have an impact on the quantity and quality of hospital bed utilization both directly and indirectly. Among them is the MATLAB

program in government hospitals to build a bed allocation system according to specific conditions, disease waiting times and other factors to improve service capabilities, reduce patient waiting times, and save health resources[2] or wear *System Dynamics* to intervene in improving the allocation of beds in government hospitals by increasing the number of beds and increasing the number of home care services simultaneously[3].

National health insurance greatly affects the efficiency variation of government and private hospitals[6]. National health insurance is an opportunity for private hospitals as a referral that ultimately increases revenue by increasing the BOR[7]. However, on the other hand, most private hospitals do not participate in the national health insurance scheme due to low and delayed claim payments, limited coverage of healthcare services in national health schemes, high administrative burden for claims submission and verification and lack of understanding of terms and policies[9]. One of the national health insurance payment schemes is payment with Diagnosis Related Group (DRG)[13]. Changes in the tariff scheme can make no significant difference in response, either according to the amount of tariff change and according to the level of bed occupancy for orthopedic patients before and after implementation *Diagnosis Related Group* (DRG)[11]. In addition to DRG, there is also a DIP payment scheme (*Diagnosis-Intervention Pocket*). DIP can make a decrease in the volume of inpatients, decrease the length of stay in primary and rural hospitals. However, secondary and tertiary hospitals continue to accept more patients[20].

Comprehensive reform in the form of legal amendments-Invite to simplify the enrolment and selection mechanism *First Service Point* (FSP), digitization of the claims and reimbursement process, integration of fragmented financing schemes into a single fund, and application of costs-Sharing that is directed to control *Moral hazard* and ensuring financial sustainability. All of this must be supported by a strong political commitment and an increased role of local governments in the implementation of the program[7]. The absence of a national referral system policy and patients are free to choose hospitals makes the distribution of bed filling uneven[10]. Therefore, the government should improve management, redistribute resources, strengthen referral systems, and implement evidence-based management practices need to be policy priorities to improve efficiency, effectiveness, and equitable access to health services[12].

Strategic planning, policies that emphasize reducing the need for hospitalizations through strengthening primary care and health promotion are concrete steps to control bed occupancy rates and reduce national health financing[17]. Reductions in national health financing have resulted in a reduction in hospital beds. The death rate is also decreasing. However, quality comes at the expense of public health. In contrast to the above statement, the reduction of beds is not solely an increase in efficiency[21].

CONCLUSION

Demand, provision, and policy are the main determinants of hospital bed utilization. Further research examining the interaction of these three factors is needed to formulate strategic recommendations in capacity management and equitable access to inpatient services.

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