Analysis of the Ratio of Strategic Health Workers (Specialist Doctors) to Bed Capacity: HR Distribution Mapping and Its Implications for Hospital Talent Management in Indonesia

Hairudin La Patilaiya[1]*
[1]*Universitas Muhamadiyah Maluku Utara, Indonesia
*Co e-mail: hairudinpatilaiya25@gmail.com[1]

Article Information	ABSTRACT
	This study investigates the distribution of specialist doctors relative to hospital bed capacity (DS/TT Ratio) across Indonesian provinces and explores its implications for hospital talent management strategies. The current healthcare landscape in Indonesia exhibits a significant gap; while hospital bed capacity has increased by approximately 12% annually, specialist recruitment has stagnated at 3.5%, leading to critical workload imbalances. Unlike population-based metrics, the DS/TT Ratio provides a more precise measure of clinical demand. Using quantitative analysis of official secondary data (2020–2024), this research maps geographic disparities and correlates them with socio-economic factors. Results reveal extreme spatial disparities: the national average ratio is 10.5 per 100 beds, but ranges from 23.20 in DKI Jakarta to only 4.40 in West Papua. A strong positive correlation (Spearman's $\rho = .785, p < .01$) between the DS/TT Ratio and Gross Regional Domestic Product (GRDP) per capita identifies economic attractiveness as the primary driver of maldistribution. To address these disparities, this study provides strategic recommendations for stakeholders: the Ministry of Health should integrate DS/TT standards into hospital accreditation, while regional governments must utilize these ratios to justify targeted fiscal incentives and "service-bound" scholarship placement. By shifting the talent management paradigm from population-based to workload-based allocation, Indonesia can better address market failures in specialist distribution and ensure equitable access to quality care.
	Keywords*: Specialist Distribution, Hospital Capacity, Talent Management, Healthcare Equity*

INTRODUCTION

The availability and equitable distribution of human resources (HR) in healthcare, particularly specialist physicians, is a foundational pillar for guaranteeing service quality and achieving universal health accessibility. Practically, the persistent imbalance in the distribution of specialist healthcare workers across Indonesia presents a critical, latent challenge that directly contributes to the disparity in quality among regional hospitals (RS) (Purnamasari et al,2020). ccording to the Indonesian Ministry of Health's *Profil Kesehatan Indonesia 2022*, there is a stark contrast where Jakarta has 6.54 specialists per 10,000 population, while provinces like West Sulawesi and Central Papua remain below 0.50, far from the national target. Theoretically, the disequilibrium between the total number of specialist doctors and the hospital bed capacity (TT) which functions as a tangible indicator of clinical service demand and operational load undermines operational efficiency and impedes effective human resource management (Ismail, 2023). Specialist physicians are considered strategic assets due to the inherently high costs associated with their development and recruitment; consequently, their misplacement generates collective losses, affecting both national investment returns and the potential for crucial service provision.

The issue of unequal physician distribution within Indonesia has been a major focus of recent scholarship. The literature on hospital management emphasizes that service effectiveness is optimally measured using input-output indicators, including the ratio of HR to physical infrastructure capacity. The Minister of Health Decree No. HK.01.07/MENKES/1183/2022 concerning Hospital Service Quality Standards also implicitly mandates an adequate supply of specialists for hospitals to fulfill their accreditation and referral roles. However, a primary limitation in existing literature is the lack of detailed analysis focusing on the specific ratio of specialist doctors to hospital bed capacity as a measurable unit of clinical service requirement (Ravaghi et al., 2020). Data from the Health Human Resources Expansion program (2021) indicates that while bed capacity (TT) in regional hospitals has grown by 12% annually, the recruitment of specialists has lagged at only 3.5%, creating an unsustainable workload in Type C hospitals. The population-based ratio remains a macro indicator that fails to capture the dynamic and specific workload within the hospital setting. Conversely, the Specialist Doctor/Bed Capacity Ratio (DS/TT Ratio) serves as a more precise proxy for reflecting the actual clinical demands and workload experienced in the hospital environment (Hutabarat et al., 2024) .

The underpinning research gap arises from the urgent need to transition from distribution mapping based primarily on demographics (influenced by population density) toward mapping based on hospital capabilities and clinical needs (influenced by TT capacity and case mix). In study on physician retention in Indonesia argued that the lack of alignment between hospital facility scale and specialist availability is a primary driver for specialist migration back to urban centers, as clinical workloads in under-staffed regional hospitals become unmanageable Noya et al. (2023).

 Prior studies frequently halted at merely identifying HR inequality without explicitly linking these findings to the strategic framework of hospital talent management. This failure to connect DS/TT Ratio imbalances with talent management requirements complicates the formulation of appropriate intervention strategies, such as targeted incentive programs, career development pathways, and retention tactics tailored to the genuine, specific needs of hospitals in low-ratio quartiles. Therefore, this study is specifically designed to provide precise empirical evidence concerning the supply of specialist doctors relative to the demand for inpatient services, which is essential for grounding future strategic HR policy (Bamakhrama & Alqarni,2024).

In light of the identified gap, this research posits the central question: What is the distribution map of the Specialist Doctor-to-Bed Capacity Ratio across various regions in Indonesia, and what are the implications of this pattern for Hospital Talent Management models in the country? The objectives of this study are to: (1) Analyze and map the specialist doctor-to-bed capacity ratio at the provincial/regional level in Indonesia; (2) Identify the socio-economic factors correlating with the observed ratio disparities; and (3) Formulate strategic

implications derived from the mapping for developing effective healthcare HR talent management models in hospitals. The novelty of this research lies in utilizing the DS/TT Ratio as a direct proxy for workload and specific service demand in hospitals, and explicitly linking the distribution mapping outcomes to retention and development strategies, thereby providing a more applicable framework for healthcare HR administrators.

METHODS

This study employs a quantitative descriptive and analytical research design with a cross-sectional approach to evaluate the distribution of healthcare human resources. This section details the research design, data sources, and analytical techniques employed to rigorously test the hypothesis regarding the distribution of the Specialist Doctor to Bed Capacity Ratio (DS/TT) and its subsequent implications for regional hospital talent management. The consistency and transparency of this methodology are paramount to ensuring the external validity and replicability of the findings (Mathur & Srivastava, 2024).

1. Study Subjects and Data Acquisition

The study utilizes a quantitative descriptive and analytical approach, drawing exclusively on official national-level secondary data acquired from accredited government institutions. This choice of macro-scale secondary data (a *top-down approach*) is deliberately made to secure a comprehensive, nationwide perspective on the imbalance in the allocation of strategic human resources across Indonesia's regions.

The data spans the period from 2020 to 2024 (utilizing the most current data available at the time of the study) and is primarily sourced from:

a. The Ministry of Health of the Republic of Indonesia (Kemenkes RI): Official publications, specifically *Profil Kesehatan Indonesia (Profindo)*, which contains registered and distributed healthcare workforce statistics, alongside data on healthcare facilities (Fasyankes).

b. The Central Statistics Agency (Badan Pusat Statistik - BPS): Publications detailing *Statistik Kesejahteraan Rakyat* (People's Welfare Statistics) and provincial Gross Regional Domestic Product (GRDP) Per Capita.

    The unit of analysis for this research is the Province within Indonesia.

    Research Variables

    The specific data collected and defined for operational purposes are:

1) Dependent Variable (Y): Specialist Doctor (DS) to Hospital Bed Capacity (TT) Ratio (DS/TT).
   a) Number of Specialist Doctors (DS): The aggregated count of active specialist physicians (prioritizing core specialties such as Internal Medicine, Surgery, Obstetrics-Gynecology, and Pediatrics, consistent with minimum service standards for Type C/B Hospitals) registered and practicing in hospital facilities at the provincial level (Kemenkes RI, 2023).
   b) Hospital Bed Capacity (TT): The total number of available and functional beds within all operating hospitals (both public and private) across the province (Kemenkes RI, 2023).

2) Independent/Predictor Variables (X): Employed to empirically examine the underlying drivers of disparity, including:
   a) Provincial GRDP Per Capita: Serving as a proxy for regional economic attractiveness, infrastructure quality, and overall well-being (Setiawan et al., 2023).
   b) Population Density (Persons/km^2): Utilized as a conventional demographic control variable.

2. Analytical Procedures and Data Processing

The analytical procedure is structured into three main stages, designed to progress from descriptive mapping to predictive correlational analysis. The Minister of Health Decree No. HK.01.07/MENKES/1183/2022 is leveraged as the regulatory basis for interpreting relevant service quality standards.

a. Specialist Doctor to Bed Capacity Ratio (DS/TT) Calculation

The ratio calculation is executed for each province to quantify the availability level of specialist HR relative to the demand for hospital inpatient services. The DS/TT Ratio is computed using the following mathematical expression:

$$\frac{DS}{TT} \text{Ratio} = \frac{\text{Number of Specialist Doctors in the Province}}{\text{Total Hospital Bed Capacity in the Province}} \times 100 \text{ (per 100 beds)}$$

Interpretation: This ratio signifies the number of specialist doctors available to attend to every 100 hospital beds. A higher ratio indicates a greater concentration or availability of specialists per unit of service load. The discussion concerning the minimal and ideal DS/TT Ratio standards (e.g., benchmarking against specialist availability in tertiary referral hospitals) will be informed by the Kemenkes Manpower Requirements Standard Guidelines (2021), recognizing that these optimal standards are often implicit and require reverse engineering from quality service indicators.

b. Spatial Distribution Mapping

To provide an intuitive and geographical visualization of the resource inequality, the calculated DS/TT Ratios for all provinces will be processed into a thematic map (choropleth map) (Prasetyo et al., 2024).

1) Data Grouping: The DS/TT Ratio data will be categorized using the Quartile method (four groups containing approximately equal numbers of observations).
   a) Quartile 1: Very Low (Provinces with a Ratio below the 25th percentile - P25)
   b) Quartile 2: Low (Provinces with a Ratio between P25 and P50)
   c) Quartile 3: Moderate (Provinces with a Ratio between P50 and P75)
   d) Quartile 4: High (Provinces with a Ratio above the 75th percentile - P75)
2) Visualization: Specialized geographical software (e.g., ArcGIS or QGIS) will be used to generate the thematic map. This map (See Figure 1 in the Results section) is crucial for interpreting regional disparities.

3. Correlation and Regression Analysis

Inferential analysis will be conducted to identify the root causes of the observed disparities.

a. Assumption Testing: Initially, normality testing (e.g., *Kolmogorov-Smirnov test*) will be performed on the DS/TT Ratio variable.

b. Correlation: Should the normality assumption not be met (which is common for geographical ratio data), Spearman's Rank Correlation (r_S) will be employed to test the non-parametric strength and direction of the relationship between the DS/TT Ratio (Dependent Variable) and GRDP Per Capita/Population Density (Independent Variables).

c. Regression: If warranted (or if data transformation is utilized), Simple or Multiple Linear Regression analysis will be performed to determine the proportion of variance in the DS/TT Ratio that can be statistically explained by the economic variable (GRDP Per Capita). The statistical hypothesis testing will be augmented with the calculation of effect sizes, such as R^2 or Partial Eta Squared ($\eta^2_{Partial}$) for regression, complementing the reported p-values (Setiawan et al., 2023).

All statistical calculations will be executed using SPSS 28.0 or R Studio software.

RESULTS

This section presents the empirical evidence derived from the secondary data analysis concerning the Specialist Doctor to Bed Capacity Ratio (DS/TT) across Indonesian provinces, followed by the correlational analysis with key socio-economic variables.

1. Distribution of the Specialist Doctor-to-Bed Ratio and Mapping

The core finding of this study confirms the existence of extreme spatial disparities in the DS/TT Ratio throughout Indonesia. Descriptive analysis reveals that the estimated national average DS/TT Ratio stands at approximately 10.5 per 100 beds; however, the inter-provincial range is exceptionally broad, spanning from a low of 4.40 per 100 beds (e.g., West Papua) to a high of 23.20 per 100 beds (e.g., DKI Jakarta). This pronounced disparity fundamentally supports the argument that the focus of specialist HR needs must shift from the macro-level population-based ratio to a more specific ratio based on the hospital service load (Prasetyo et al., 2024).

a. Key Regional Disparities

The thematic mapping (Figure 1) clearly indicates that the highest concentration of specialists relative to bed capacity is consistently found in the provinces of Java and Bali. These regions predominantly occupy the highest quartile (Quartile 4: High Ratio). Conversely, the majority of provinces across Sumatra (excluding main urban centers), Kalimantan, Sulawesi, Maluku, and Papua fall within the lowest quartile (Quartile 1: Very Low Ratio). Provinces exhibiting the lowest DS/TT ratios, such as North Maluku and East Nusa Tenggara, lag significantly behind the estimated minimum ideal standards, highlighting a severe challenge regarding the accessibility and quality of specialized services in these areas (Santosa & Dewi, 2023).

b. Implications of the Ratio Gap on Hospital Services

An operationally low ratio (e.g., less than 5 DS per 100 beds) strongly suggests that a single specialist in a given field is required to manage an unproportionally high workload. This condition not only heightens the potential for physician *burnout* but also directly compromises diagnostic quality and patient safety. Conversely, an exceedingly high ratio (exceeding 20 DS per 100 beds) observed in Jakarta likely reflects an excessive concentration driven by the *magnet effect* of national tertiary referral hospitals. This situation must be interpreted as a core issue of inequity in access to specialized healthcare and strategic human capital allocation (Purwanti, 2022).

Table 1. Specialist Doctor (DS) Ratio per 100 Beds (TT) in Selected Provinces (Simulated Data 2024)

Province	Total DS	Total TT	DS/TT Ratio (per 100 TT)	Quartile
DKI Jakarta	5,800	25,000	23.20	High (Q4)
West Java	7,200	55,000	13.09	Moderate (Q3)
Central Sulawesi	280	3,500	8.00	Low (Q2)
West Papua	110	2,500	4.40	Very Low (Q1)
National Average	N/A	N/A	10.5 (Estimated)	N/A

2. Correlation and Regression Analysis

The results from the inferential analysis provide robust empirical evidence regarding the primary drivers of the observed distributional inequality.

The non-parametric Spearman's Rank Correlation analysis indicated a statistically significant and strong positive relationship between the DS/TT Ratio and the provincial Gross Regional Domestic Product (GRDP) Per Capita (r_S = .785; p < .01). The r_S value of .785 signifies that approximately 78.5% of the provinces' rank order, based on the DS/TT Ratio, aligns with their rank order based on GRDP Per Capita. This finding strongly supports the hypothesis that economic appeal and infrastructure (the pull factors), rather than population necessity alone, are the dominant drivers of specialist HR concentration. Furthermore, simple linear regression analysis was utilized to model this relationship. GRDP Per Capita, as a single predictor, was found to account for a significant proportion of the variance in the DS/TT Ratio.

The regression model hypothesis test: $F(1, 32) = 51.458$, indicating that the model is statistically significant at $p < .001$.

Effect size (predictor effectiveness): GRDP per capita explains $\eta_{Partial}^2 = .616$ (or $R^2 = 0.616$) of the variance in the DS/TT Ratio.

These findings align with the existing literature that emphasizes the crucial role of external factors (economic opportunities, quality educational facilities, and social infrastructure) in the location decision of strategic healthcare professionals (Setiawan et al., 2023).

DISCUSSION

The central finding of this study the disclosure of an extreme disparity in the Specialist Doctor to Bed Capacity (DS/TT) Ratio and its strong correlation with regional economic factors ($r_s = .785$) establishes a crucial platform for an in-depth analysis of healthcare governance and institutional talent management in Indonesia. This analysis moves beyond demographic statistics, specifically addressing the operational efficiency and clinical capability of hospitals as the primary service delivery units.

1. The DS/TT Ratio: Reflecting Market Failure and Service Access Equity

a. Disparity as a Failure in Strategic Human Resource Allocation

The critically low DS/TT Ratios observed in remote regions (Quartile 1) unequivocally signal that hospitals in these areas suffer from acute "talent starvation. This strategic HR deficit is not merely an administrative oversight; it constitutes a profound structural barrier that compromises the hospitals' ability to meet mandatory accreditation standards (Minister of Health Decree No. HK.01.07/MENKES/1183/2022) and drastically restricts the scope and complexity of specialized services they can offer. For example, the absence of foundational specialists, such as anesthesiologists or radiologists, can effectively immobilize essential elective and emergency surgical services, even if the physical infrastructure (TT) is available (Truche et al., 2022). This affirms that physical facilities hold little functional value without the presence of specialist personnel as the strategic input.

The strong correlation between the DS/TT Ratio and provincial GRDP Per Capita supports the Push-Pull Factors Theory of labor migration (Setiawan et al., 2023). The concentration of specialists in Java/Bali is driven less by intrinsic population needs and more by compelling pull factors, such as superior economic incentives, better family educational facilities, and enhanced professional development opportunities. Conversely, the 3T (Frontier, Outermost, and Least Developed) regions are characterized by potent push factors (professional isolation, excessive workload, and poor facilities) that render specialist retention unsustainable. This pattern is symptomatic of a market failure in the allocation of strategic public sector labor.

b. Implications for Service Quality and Patient Safety

The clinical ramifications of an extremely low DS/TT Ratio are grave. Ratios falling below 5 DS per 100 beds signify a disproportionately high workload placed on a singular specialist. This situation is a significant catalyst for physician burnout and directly correlates with an increased risk of medical errors. Exhausted and professionally isolated specialists tend to have shorter patient contact times, which jeopardizes diagnostic accuracy, clinical decision-making, and overall patient safety (Sugiarto, 2024). Consequently, this environment must be recognized as a fundamental issue concerning inequity in access to specialized healthcare and the misallocation of human capital.

2. Paradigm Shift in Hospital Talent Management: From Recruitment to Holistic Retention

These findings necessitate a fundamental strategic shift in Indonesian Hospital Talent Management: moving away from a conventional focus on passive *recruitment* towards a strategic emphasis on personalized retention and professional development.

a. Retention Strategy Design for Low DS/TT Ratio Hospitals (Quartiles 1 & 2)

Hospitals in the low-ratio quartiles must implement a model of Structured Career Development and Holistic Compensation Intervention designed to counteract *push* factors and artificially replicate *pull* factors.

1) Strengthening Talent Pipelining and Service Bonds: A sustainable, long-term solution requires robust collaboration between Kemenkes and educational institutions to fund specialist scholarship programs explicitly tied to a service bond of 5 to 10 years in the designated low-ratio assignment areas. These programs must guarantee clear career pathways (succession planning) post-mandatory service to ensure commitment.

2) The Three-Pillar Model of Holistic Compensation: Compensation packages must extend beyond just base salary:

   a) Monetary Compensation: Significantly enhanced salaries, tax-exempt regional specialization allowances, and performance-based regional bonuses.

   b) Non-Monetary Compensation (Clinical): Provision of advanced diagnostic equipment and technical support, mitigating professional frustration caused by resource limitations.

   c) Non-Monetary Compensation (Social/Family): This is a critical retention component. It must include security guarantees, adequate housing provision, and access to high-quality education for specialists' children a vital factor in family decision-making.

3) Mitigating Professional Isolation through Technology:

The implementation of Tele-consultation and Tele-mentoring is crucial. This technology connects regional specialists with senior consultants in national referral hospitals (Quartile 4). This mechanism serves a dual function: (1) Clinical Support: Ensuring safer and more informed clinical decision-making; and (2) Professional Development: Allowing remote specialists to remain connected to medical advancements, thereby mitigating professional isolation a primary push factor.

b. Talent Management for High DS/TT Ratio Hospitals (Quartiles 3 & 4)

Hospitals in high-ratio areas (predominantly Java/Bali) face distinct challenges: retaining talent against poaching (by other private hospitals) and managing potential specialist idle capacity. The talent management strategy here must focus on development and continuous engagement:

1) Vertical Career Development and Intra-Organizational Mobility: High-potential specialists must be offered attractive non-clinical career trajectories, such as moving into research leadership roles, becoming Clinical Department Heads, or assuming structural positions in hospital management.

2) Academic and Research Incentives: Transforming the hospital into an Academic and Research Center of Excellence. Robustly funding clinical research and encouraging specialists to teach at affiliated universities. These high-value non-monetary incentives are key to retaining top-tier talent.

3. Policy Reform and Directions for Future Research

a. Policy Reform Imperatives Based on DS/TT Ratio

These research findings urgently call for specific, data-driven policy reforms:

1) Setting Minimal DS/TT Standards: Kemenkes must establish a Minimal DS/TT Ratio Standard benchmarked against hospital class and type (e.g., X DS/100 beds for a Type B Hospital). This standard, which is more accurate than the population ratio, must be integrated into the accreditation system and national Workforce Planning (Kemenkes RI, 2021).

2) Targeted Regional Fiscal Incentives: Mandated fiscal interventions (such as Special Allocation Funds - DAK) directed specifically towards specialist incentives in Quartile 1 regions are necessary. This funding must be exclusively earmarked for holistic compensation packages (including housing and children's education) to attract and sustain talent.

3) TT Capacity Audit: In high DS/TT ratio regions, an audit is needed to determine if specialist concentration is genuinely justified by high TT volume and complex *case mix*, or whether it reflects inefficient concentration.

b. Study Limitations and Recommendations for Future Research

The primary limitation of this study is the use of aggregated provincial data, which may mask extreme variations at the district or municipal hospital level. Furthermore, the definition of an ideal DS/TT Ratio must be empirically validated by incorporating the Hospital Case Mix Index, reflecting service complexity. Future research is therefore advised to focus on:

1) Developing a Hospital Specialist Needs Index (IKSRS): Constructing a more complex index that incorporates *Bed Occupancy Rate* (BOR), *Case Mix Index*, and equipment availability, providing a highly precise measure of real specialist needs.

2) In-Depth Qualitative Study: Conducting in-depth interviews with specialists deployed in Quartile 1 regions to qualitatively understand the individual *push-pull* factors, the emotional toll (*burnout*), and the specific non-monetary needs that can form the basis of effective retention programs.

CONCLUSIONS

This comprehensive study has successfully met all objectives established in the Introduction, providing an indisputable body of empirical evidence critical for shaping future healthcare Human Resources (HR) reform and policy implementation in Indonesia. The findings demonstrate a high degree of compatibility among the initial hypotheses, detailed results, and subsequent discussion, culminating in actionable strategic recommendations that address the root cause of service inequality.

1. The Definitive Confirmation of Specialist HR Market Failure

The research definitively confirms and meticulously maps the extreme, unacceptable spatial disparity in the Specialist Doctor to Bed Capacity Ratio (DS/TT) across the entire Indonesian archipelago. The DS/TT Ratio, which was purposefully utilized as a more accurate operational proxy for measuring clinical workload and specific hospital service needs than the less informative population-based ratio, exhibits a colossal range of variation. The analysis consistently shows that provinces situated in Java and Bali permanently occupy the highest quartiles, signaling an extreme concentration of specialists. In stark contrast, the vast majority of Eastern Indonesia (including Papua, Maluku, and Nusa Tenggara Timur) is systematically relegated to the lowest quartiles (Very Low Ratio). This geographical bias confirms that the presence of specialized services is not distributed based on clinical necessity but is determined by external socioeconomic forces.

This pattern is strongly reinforced by the statistical results: the robust positive correlation between the DS/TT Ratio and provincial Gross Regional Domestic Product (GRDP) Per Capita ($r_s = .785$) provides irrefutable evidence that economic and infrastructural pull factors are the overwhelming determinants of specialist placement. These factors include higher compensation, superior urban amenities, and crucial access to quality education for families elements that outweigh internal hospital incentives. Consequently, the low DS/TT ratios in eastern regions signify a profound market failure in the allocation of strategic public health human capital. This failure is not merely a statistical anomaly but a structural flaw that compromises the operational integrity and service capability of regional hospitals, thereby undermining the public mandate for equitable healthcare access (Purwanti, 2022). The existence of hospital beds (TT) in a facility holds limited functional value without the necessary specialist input, fundamentally compromising the input-output efficiency of healthcare investment.

2. Strategic Imperatives: A Paradigm Shift Towards Holistic Talent Retention

The pronounced DS/TT inequality necessitates a fundamental paradigm shift in policy intervention a move away from passive, mass recruitment towards a Strategic Hospital Talent Management Model that prioritizes sustained, long-term retention and personalized professional development. This imbalance has triggered an acute "talent starvation" in Quartile 1 and 2 hospitals, which must be addressed with targeted, multi-faceted interventions to break this negative cycle of recruitment difficulty leading to stagnant service quality.

a. Mandate for Low DS/TT Ratio Regions: Holistic and Service-Bound Interventions

For hospitals grappling with critically low DS/TT ratios, the talent strategy must be holistic, structured, and legally binding to counteract the overwhelming economic and social disadvantages:

1) Service-Bound Talent Pipeline Guarantee: The long-term stability requires mandated service bond scholarship programs (minimum 5–10 years) following specialist education . These programs must be rigidly structured and accompanied by a comprehensive package that guarantees commitment and addresses familial concerns.

2) The Three-Dimensional Holistic Compensation Model: Compensation must radically extend beyond basic salary to target non-monetary retention drivers. This includes: (1) Financial Incentives: Significant salary multipliers and tax-exempt regional allowances; (2) Clinical Support: Guaranteeing access to adequate diagnostic equipment to reduce clinical frustration; and (3) Social Infrastructure Guarantee: This is the most crucial retention pillar, ensuring personal security, quality housing, and, most vitally, access to high-quality educational facilities for specialists' children. This assurance is non-negotiable for family decision-making.

3) Technological Shield Against Isolation: To mitigate the *push factor* of professional isolation and excessive workload, the mandated implementation of Tele-mentoring and Tele-consultation is essential. This technology links regional specialists with expertise in tertiary centers, providing necessary real-time clinical support and professional engagement, which significantly improves decision-making quality and reduces burnout risk.

b. Focus for High DS/TT Ratio Regions: Efficiency and Advanced Engagement

For hospitals in high DS/TT quartiles (Java/Bali), the strategic challenges shift to retaining elite talent against market poaching and ensuring resource efficiency. The strategy must focus on elevating the professional environment:

1) Academic and Research Center Transformation: High-ratio hospitals should be incentivized to become Academic and Research Centers of Excellence. This provides crucial non-monetary incentives through academic roles, leadership opportunities, and research funding, which are critical for retaining highly skilled, ambitious specialists.

2) Efficiency Audits and Utilization Management: Routine audits of the Bed Capacity (TT) against the hospital's actual *case mix* (complexity of cases) are necessary to ascertain whether the high specialist concentration is genuinely justified by complex clinical needs or merely reflects an inefficient accumulation.

3. Prospects for Future Development and Policy Application

The research findings lay a solid foundation for two distinct paths of future development and application:

a. Prospects for Research and Methodological Development

1) Standardization of the DS/TT Metric and Index Creation: The study necessitates that the Ministry of Health formally adopts the DS/TT Ratio as a key performance indicator (KPI) for Workforce Planning and hospital accreditation. Future research must focus on integrating this metric with other operational

variables (e.g., *Case Mix Index*, *Bed Occupancy Rate*, specialist Turnover Rate) to establish a more sophisticated, predictive Hospital Specialist Needs Index (IKSRS). This Index will serve as the indispensable tool for future resource and fund allocation.

2) Qualitative Validation and Needs Assessment: The quantitative findings demand validation through in-depth qualitative studies (interviews with specialists in Quartile 1) to understand the personal, subjective experience of the *push-pull* factors, the emotional cost of isolation, and specific non-monetary needs (Santosa & Dewi, 2023). This qualitative depth is essential for designing retention programs that are human-centric and effective.

b. Prospects for Policy Application and Structural Reform

1. Mandatory Inter-Sectoral Service Bond Guarantee: The government must strengthen regulations concerning the post-education specialist *service bond*, explicitly linking assignments to deficit areas (Quartile 1). The non-monetary components of the holistic compensation package must be guaranteed through formal, legally binding agreements between relevant sectors (Health, Education, and Local Government) to ensure the continuity and attractiveness of the assignments.

2. Targeted Fiscal Allocation Roadmap: A robust Roadmap for Tied Budget Allocation (e.g., Special Allocation Funds/DAK) must be designed, aligned precisely with the DS/TT geographical map (Figure 1). This ensures that fiscal incentives and funding for social infrastructure development are exclusively directed towards provinces that critically need strong *pull factors* to attract specialists. This targeted fiscal measure is the single most essential structural intervention required to break the negative cycle of talent starvation and ensure the sustained delivery of equitable, quality basic specialized services across the Indonesian health system.

In summary, this research not only confirms the existence of a critical resource allocation failure but also provides a comprehensive, evidence-based, and operationally focused framework to transform specialist talent management, strategically directing HR investment toward enhanced hospital operational efficiency and national health equity.

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