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Comparative Analysis of INA-CBGs Tariffs and Unit Cost of Cesarean Section: A Systematic Review in Indonesian Hospitals

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ABSTRACT

National Health Insurance (JKN) requires efficient, equitable, and sustainable healthcare services. However, various studies indicate discrepancies between INA-CBGs tariffs and actual hospital service costs. One of the procedures with the highest claim rates is Cesarean Section (CS), which exhibits significant disparities. This study aims to analyze the average unit cost associated with Cesarean Sections (CS) across Indonesia using the Activity-Based Costing (ABC) method. A systematic literature review (SLR) approach was employed, analyzing articles published between 2017–2024. Relevant articles were retrieved through the Google Scholar database. Of the 79 articles initially identified, 37 passed the preliminary screening, and 12 articles met all inclusion criteria. Results indicate that INA-CBGs tariffs for CS procedures only cover 25%–54% of actual costs, varying by service class, hospital location, and operational efficiency. This mismatch contributes to financial deficits in hospitals, potentially compromising service quality, restricting medical equipment procurement, and increasing healthcare professionals' workloads. Moreover, regional cost variations demonstrate that the current tariff system inadequately considers geographic factors and service complexity. Hospitals in major cities like Bandung report nearly double the unit costs compared to regions such as Yogyakarta or Lampung. Therefore, findings highlight the necessity of reformulating INA-CBGs tariffs to

better reflect hospitals' actual conditions. Without updates based on cost-of-service, the financing system risks perpetuating service disparities and reducing the quality of national healthcare. The review findings indicate that the actual cost of Cesarean Section (CS) procedures in Indonesian hospitals is significantly higher than the INA-CBGs tariffs reimbursed by BPJS, with disparities ranging from 46% to 75%.

Keywords
Caesarean Section
Unit cost
INA-CBGs
Activity-Based Costing
JKN

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Introduction

The issue of healthcare financing in the era of the National Health Insurance (JKN) has become increasingly prominent, driven by rising demands for services that are high-quality, equitable, and sustainable. For the government, ensuring efficiency in the payment system is key to maintaining fiscal stability while expanding service coverage. Meanwhile, hospitals face considerable challenges when tariff systems fail to reflect the actual costs of care, threatening operational sustainability, degrading service quality, and limiting the ability to invest in resources. For patients, these financing gaps can directly impact access to adequate and timely healthcare. The mismatch between tariffs rates and actual costs creates complex and multilayered financial pressures for all stakeholders [1], [2], [3].

In practice, the JKN system managed by BPJS Kesehatan employs two main payment schemes: performance-based capitation (KBK) for primary care providers, and the Indonesia Case-Based Groups (INA-CBGs) for advanced referral healthcare facilities. The INA-CBGs scheme utilizes a bundled payment system determined by diagnosis and medical procedures performed in hospitals. Its primary goal is to promote efficiency and improve the quality of healthcare services. However, in practice, this scheme faces numerous challenges, especially regarding the misalignment between set tariffs and the actual costs incurred by hospitals [4].

A clear example of this tariff-cost imbalance is found in the case of Cesarean Section (CS), which is one of the most frequently claimed procedures under JKN. Studies have shown a significant disparity between the INA-CBGs tariffs and the actual hospital costs for this procedure. One study reported unit costs for CS in Class I and Class III wards to be IDR 6,293,944 and IDR 6,148,056 respectively, while the INA-CBGs tariffs received were substantially lower [5]. Another study found that the average actual cost for CS reached IDR

7,938,303, whereas the INA-CBGs tariffs was only about IDR 4,328,693, which accounts for approximately 54% of the total hospital expenditure [6]. This gap is exacerbated by factors such as medication prices, medical equipment costs, variation in service standards across hospitals, and ongoing inflationary pressures.

The misalignment between INA-CBGs tariffs and actual costs has a significant impact on hospital finances, particularly for institutions serving a high volume of JKN patients. The consequences include limited procurement of medical equipment, reduced human resource quality, and overall deterioration in healthcare service standards. These may manifest as delayed medical procedures, restricted access to facilities, or even cost-shifting onto patients. Moreover, the absence of periodic updates to INA-CBGs tariffs worsens the situation, especially in light of steadily rising hospital operational costs [7].

Past research in Indonesia has studied gaps between INA-CBGs tariffs and hospital charges for cesarean section (CS), but evidence is still scattered and frequently confined to one institution. To the best of our knowledge, no systematic review has integrated hospital-level costing research on CS across Indonesia, valued costs to a common base year, and directly connected the findings to national health insurance (JKN) policy. Global evidence shows similar gaps in Rwanda, Cambodia, and Turkey but evidence remains under-consolidated for Indonesia. It is crucial to bridge this gap as cesarean section now accounts for a considerable and rising share of maternal health expenditure under JKN. By synthesizing unit costs studies systematically and critically reviewing them, the review provides both policy relevance (evidence on tariff adjustment) and methodological innovation (synthesis inflated).

To address this gap, unit cost analysis is essential for understanding the real financing conditions faced by hospitals. Various approaches have been used to calculate unit costs, including Traditional Costing, Job Order Costing, Process Costing, Standard Costing, Marginal Costing, Full Costing, and Time-Driven Activity-Based Costing (TDABC). This study adopts the Activity-Based Costing (ABC) method, as it is considered more accurate in allocating costs, especially overheads costs, based on actual activities consumed by the services. ABC also identifies hidden indirect costs and non-value-adding activities, thereby promoting greater efficiency and cost control [8]. Furthermore, ABC is the most widely used approach in healthcare financing analyses, making the results more relevant and representative of real hospital costs in Indonesia. Therefore, this study aims to analyze the average unit cost of CS services in Indonesia and identify the factors contributing to cost variation. To our best knowledge, this is the first systematic review in Indonesia that synthesizes hospital-level cesarean section costing research utilizing Activity-Based Costing (ABC), standardizes all costs to a uniform reference year with inflation and purchasing power parity (PPP), and compares them directly to INA-CBGs tariffs. This does not only offer a methodological contribution

through comparability across heterogeneous studies but policy salience, through associating cost differences with the sustainability of the JKN scheme.

Material And Methods

A. Study Design

This study employed a Systematic Literature Review (SLR) approach guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework (Figure 1). The review was not registered in PROSPERO, as the scope is country-specific with limited indexed evidence. This is acknowledged as a methodological limitation.

B. Data Bases and Search Strategy

Relevant articles were searched in the Google Scholar database alone from 2017 to 2024 due to the contextual nature of Indonesian hospital costing studies and even more so INA-CBGs funding of Cesarean Section (CS) services, which are generally only disseminated in local publications, conference proceedings, theses, or institutional repositories that are not listed with international databases such as PubMed or Scopus; preliminary searches for said international databases were disappointing in their material relevance, confirming Google Scholar as the optimum platform to search for context-relevant evidence. To ensure methodological comparability across the hospitals, we confined our analysis to studies which utilized the Activity-Based Costing (ABC) method where costs are allocated according to actual use of resources by every clinical pathway and yield more trustworthy unit cost estimates than the usual step-down or top-down methods.

This was vital in ensuring accurate comparisons of hospital expenses to INA-CBGs reimbursement level and removing bias from defective costing practice, and to conform to the standards of health financing to ensure effective service-specific cost estimation in low- and middle-income countries where cross-subsidization and resource allocation vary. Although these choices limit generalizability and potentially deny some grey literature, they optimize internal validity and ensure that findings are directly usable in informing tariff adjustment policy in Indonesia.

The search strategy used the keywords “unit cost,” “activity-based costing” or “ABC method,” and “caesarean section” in the title or abstract, along with at least one financing-related term such as “INA-CBGs” or “BPJS.” The complete search query applied was: ((“unit cost”[title/abstract]) OR (“activity based costing”[title/abstract]) OR (“ABC method”[title/abstract])) AND ((“caesarean section”[title/abstract]) OR (“*SC tanpa penyulit*”[title/abstract])) AND ((“INA-CBGs”[title/abstract]) OR (“BPJS”[title/abstract])) AND (“2017”[year]:“2024”[year]).

C. Studies Selection

Articles included in this review were those that identified discrepancies between hospital unit cost calculations and INA-CBGs tariffs and were relevant to the context of Cesarean section (CS) service financing in hospitals (table 1). Duplicate articles and those not meeting the inclusion criteria were excluded from analysis. We limited analysis to ABC studies for reasons of methodological comparability and consistency because ABC allocates costs more effectively to activities consumed. While this exclusion may reduce the lessons from other costing methods (e.g., step-down costing), it reduces heterogeneity and removes misclassification bias for overheads. This is identified as a limitation of our review.

Table 1. Inclusion and Exclusion Criteria

Criteria	Inclusion	Exclusion
Population	Cesarean Section (CS) cases	Non-CS cases
Intervention	Unit cost calculation using the Activity-Based Costing (ABC) method	Unit cost calculation using methods other than ABC
Comparator	-	-
Outcomes	Cost differences between unit cost and INA-CBGs tariffs	Outcomes unrelated to cost differences between unit cost and INA-CBGs tariffs
Study design	Cross-sectional	Other than cross-sectional
Publication years	2017-2024	Before 2017

D. Identification of Studies

To ensure methodological consistency, all retrieved articles were independently reviewed by the research team and assessed for relevance to the study objectives. Discrepancies in article selection or data extraction were resolved through discussion and consensus, with input from a third reviewer when necessary. A total of 79 records were initially identified via Google Scholar. After removing 9 duplicates and screening 33 titles and abstracts for relevance, 37 articles were selected for full-text review. Of these, 12 studies met all predefined inclusion and exclusion criteria and were included in the final analysis. The screening and selection process was conducted manually using Microsoft Excel. A summary of the study selection process is presented in Figure 1.

E. Data Extraction and Analysis

The review process was conducted in accordance with the PRISMA guidelines. Key data were extracted from each eligible study, including author(s), year of publication, article title, journal source, study design, setting, reported unit cost, costing methodology, and

comparison with INA-CBGs tariffs. Data were systematically organized in Microsoft Excel for synthesis. Methodological quality was assessed using the Joanna Briggs Institute (JBI) Checklist for economic evaluations. Based on this appraisal, 8 studies were classified as high quality, while 4 were rated as moderate. Study quality was assessed using the Joanna Briggs Institute (JBI) checklist. Detailed scores for each domain are presented in Supplementary Appendix. Identified sources of potential bias included incomplete cost component reporting, lack of transparency in cost calculation validation, and possible institutional reporting bias. These limitations were carefully considered in the analysis and interpretation of the results.

We extracted hospital, year, costing method, unit cost for CS, INA-CBGs tariff, and difference (surplus/deficit). The total costs were converted to 2024 Indonesian Rupiah (IDR) by applying national inflation and purchasing power parity (PPP). Cost definitions were standardized to include direct medical cost (surgical material, anesthesia, medication, and laboratory services), doctor charges, and hospital overhead. Cesarean section (CS) procedures without complications were used unless otherwise stated in the main study. Inpatient classes (Class I–III) were categorized according to reporting in each study but, where feasible, codified into Indonesia's national classification system. Implementation of Activity-Based Costing (ABC) varied among studies; some performed full activity mapping, while others utilized streamlined allocation models.

Cautious attention was given to extreme outliers to ensure robustness of results. True high-cost cases (i.e., extended hospital stays, intensive treatments, or severe complications) had their values maintained and analyzed independently, if feasible, while apparent data entry inconsistencies were deleted following verification. Duplicate datasets were also scanned for possible replication by cross-matching authorship, year of study, and hospital site to avoid double counting.

Synthesis was performed descriptively using median and interquartile range (IQR) in order to mitigate the influence of skewed values. Subgroup analyses were conducted by facility class, geographic region, and ownership category.

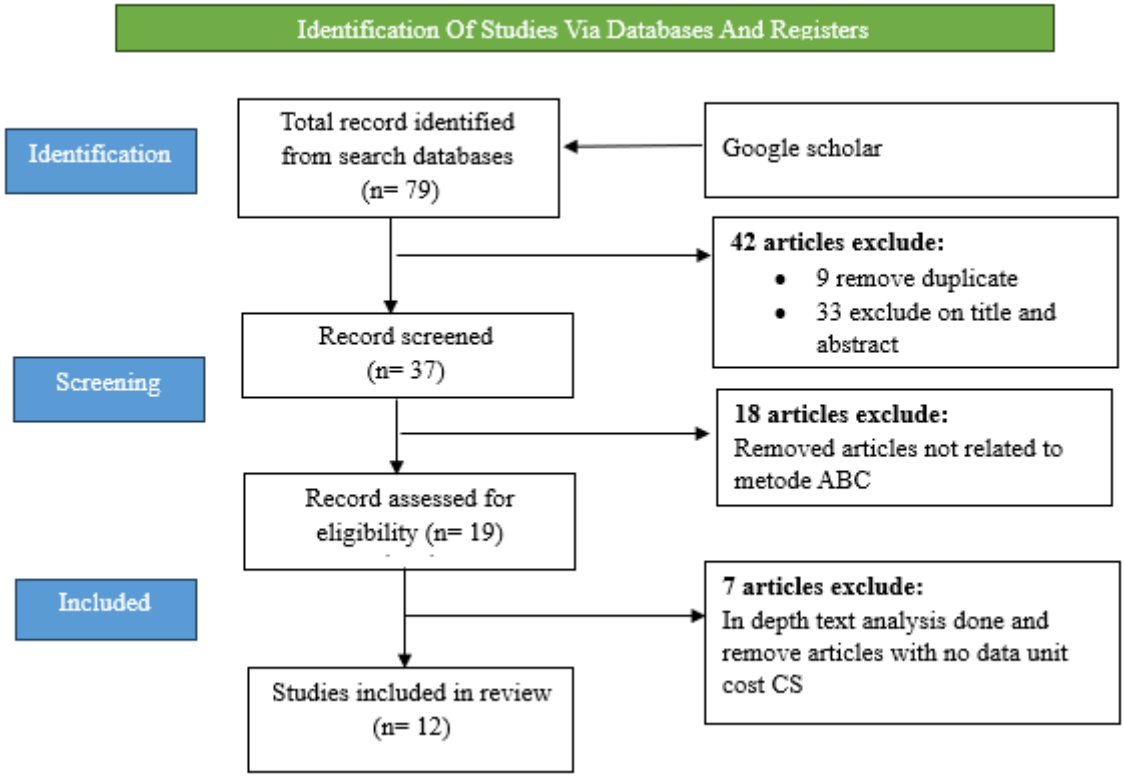


Figure 1. Systematic Review Flow Diagram Based on PRISMA Guidelines.

Results

A total of 12 studies met the inclusion criteria (Figure 1, PRISMA diagram). Collectively, they covered hospitals from 2017 to 2024, across Java, Sulawesi, and Sumatra. Based on the analysis of hospital unit cost data by class presented in Table 2, the highest average unit cost for Cesarean Section (CS) was found in Class I, amounting to IDR 6,937,944. Class II followed closely with an average cost of IDR 6,785,078, slightly lower than Class I. Class III had the lowest average unit cost, at IDR 5,257,862. These results indicate a general trend where higher levels of inpatient care are associated with increased average service costs.

In terms of the highest cost per class, the most expensive unit cost was recorded in Class I at IDR 10,499,860, followed by Class II at IDR 10,058,838, and Class III at IDR 9,489,200. Although Class III had the lowest average cost overall, there were outlier cases with exceptionally high expenditures comparable to higher care levels. This suggests variability in service needs among patients within the same class, as well as potential inconsistencies in resource utilization. Overall, these findings demonstrate the existence of cost disparities across inpatient classes. Classes I and II exhibited higher and more variable costs, while Class III was generally lower but still included several high-cost cases. These results are important for informing cost planning and efficiency strategies in healthcare facilities.

Further analysis of Table 2 reveals significant variation in the unit cost of CS procedures across hospitals in Indonesia. The highest unit cost for Class III was observed at a maternity hospital in Bandung (IDR 9,489,200), whereas the lowest was recorded at PKU Muhammadiyah Hospital in Yogyakarta (IDR 2,176,747). In Bandung, the cost structure was dominated by indirect costs, such as operations, maintenance, and depreciation. In contrast, PKU Muhammadiyah allocated more costs to direct components, particularly specialist physician fees. Anutapura General Hospital in Palu reported the highest direct cost (IDR 8,984,697), while the lowest indirect cost was found at Yogyakarta City Hospital (IDR 266,287). The cost of human resources also varied, with the highest recorded at a Type C private hospital in Tangerang (IDR 1,987,743) and the lowest at Anutapura Hospital (IDR 831,147).

Geographic location influenced cost variation. Hospitals in major cities, such as Bandung, generally reported higher unit costs compared to facilities in regions like Yogyakarta or Lampung. For instance, Bunda Liwa Maternity Hospital in Lampung reported a unit cost of IDR 4,611,509, while a Type C private maternity hospital in Yogyakarta reported IDR 4,421,217. Temporal variation also affected cost levels, with data from 2016 to 2018 showing lower costs compared to those from 2024, reflecting the impact of inflation and rising healthcare service prices. In 2018, Yogyakarta City Hospital recorded a unit cost of IDR 2,703,919, while in 2024, Bandung Maternity Hospital reported IDR 9,489,200.

After inflation adjustment to 2024 IDR, unit costs of CS ranged from IDR 7.8 million to 14.2 million, while INA-CBGs tariffs ranged from IDR 5.1 million to 10.4 million. Median deficit was IDR 3.2 million (IQR 2.4-4.1), meaning that tariffs only covered 46-75% of real costs. Unit costs in type B and private maternity hospitals were higher than in type C hospitals. Costs in Bandung and Yogyakarta were higher than in Lampung and Sulawesi.

An analysis of the twelve studies that examined the unit cost of CS services using the Activity-Based Costing (ABC) approach revealed that most hospitals operated inefficiently. Of all study sites, only five hospitals were categorized as efficient, while seven were considered inefficient based on a negative gap between actual unit cost and INA-CBGs tariffs. Hospitals in the Yogyakarta region displayed mixed efficiency outcomes; two hospitals (a Type C private maternity hospital and Bhayangkara Hospital) were categorized as efficient, while the remaining two (PKU Muhammadiyah and one general hospital) were found to be inefficient.

Hospitals located in Central Java (Kudus and Pati districts) and Central Sulawesi (Palu and North Morowali district) all demonstrated inefficiencies, primarily due to high operational costs, medical material expenditures, and specialist physician fees. Conversely, hospitals in Lampung and Tangerang showed better cost-efficiency performance, largely attributable to effective control of direct costs and structural hospital efficiency.

Table 2. Comparison of Unit Costs and INA-CBGs Tariffs Based on Literature Review.

No	Title	Unit Cost RS (Rp)			INA-CBG's (Rp)				Hospital	Location	Year of study	Method
		I	II	III	VIP	I	II	III				
1	Perhitungan Tarif Rumah Sakit dengan Metode Activity Based Costing pada Layanan Operasi Caesar Pasien JKN RSIA Kota Bandung	10,499,860	10,058,838	9,489,200		6,991,635	6,184,962	5,243,972	RSIA Kota Bandung	Bandung	2024	ABC
2	Unit Cost Calculation of Elective Caesarean section without Complications Based on The Time-Driven Activity-Based Costing Model			4,421,217				4,975,200	RSIA Swasta Type C	Yogya-karta	2023	ABC
3	Perhitungan Tarif Tindakan Sectio Caesarea Dengan Metode Activity Based Costing (ABC) System Di Rumah Sakit Umum Anutapura Palu	9,945,730	9,493,643	8,984,697					RSU Anutapura Palu	Palu	2021	ABC
4	Comparison of INA CBGs, hospital, unit cost based on the activity based costing method delivery at class C private hospitals	4,328,672				6,965,200			Class C private hospitals	Tang-gerang	2023	ABC
5	Strategi Atasi Perbedaan Unit Cost Sectio Caesaria dengan Klaim berdasarkan Tarif INA-CBG's pada Pasien BPJS di Rumah Sakit Khusus Ibu Dan Anak Bunda Liwa	5,976,887	5,801,291	5,712,651		7,421,217	6,364,746	5,301,228	RSIA Bunda Liwa	Lampung	2019	ABC
6	Analisis Activity Based Costing pada Sectio Caesarea Tanpa Penyulit Metode ERACS di RS XY Pati			5,598,201				4,521,100	RS XY Pati	Jawa tengah	2024	ABC

No	Title	Unit Cost RS (Rp)			INA-CBG's (Rp)				Hospital	Location	Year of study	Method
		I	II	III	VIP	I	II	III				
7	Kebijakan Penetapan Tarif Seksio Sesarea Tanpa Penyulit dengan Metode Activity Based Costing Berdasarkan ICD-9CM pada Jaminan Kesehatan Nasional di Rumah Sakit XY Kabupaten Kudus Tahun 2016	8,380,564	7,485,745			6,191,300	5,306,800		RS XY Kab. Kudus	Jawa tengah	2017	ABC
8	Unit Cost Analysis of Sectio Caesarea with Activity-Based Costing in Yogyakarta Hospital			2,703,919				2,200,000	Yogyakarta Hospital	Yogyakarta	2019	ABC
9	Comparison Between Unit Cost Results of The ABC Method And INACBGs Rates For BPJS Patients With Caesarea Sectio Action at Rumah Sakit Graha Sehat Probolinggo			5,484,214				5,238,800	RS Graha Sehat	Probolinggo	2024	ABC
10	Disparitas Tarif INA-CBGs dan Tarif Rumah Sakit Pasien BPJS Rawat Inap di RSUD Kolonodale, Kabupaten Morowali Utara	6,293,944		6,148,056	5,865,800	5,865,800		4,888,200	RSUD Kolnodale	RSUD Kolonodale, Kabupaten Morowali Utara	2019	ABC
11	Health Service Efficiency: Cost Analysis of Time Driven Activity Based Costing Methods in Caesar Surgery Services in PKU Muhammadiyah Hospital, Yogyakarta			2,176,747				2,200,000	RS PKU Muhammadiyah	Yogyakarta	2023	ABC
12	Analisis Unit Cost Sectio Caesaria dengan Metode Activity Based Costing di Rumah Sakit Bhayangkara Yogyakarta	3,132,954	3,028,756	2,976,265		5,120,000	3,960,000	3,960,000	RS Bhayangkara	Yogyakarta	2017	ABC

Notes: : Highest and lowest unit cost data : data not available from the article

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Discussions

A. Hospital Unit Cost Analysis and Thematic Synthesis

The analysis of hospital unit cost data by service class reveals that the highest average cost was found in Class I, amounting to IDR 6,937,944, followed by Class II at IDR 6,785,078, and the lowest in Class III at IDR 5,257,862. This gradient reflects greater resource requirements, staffing, and amenities in higher classes. Nonetheless, variation within the same class was evident, as some Class III hospitals reported outlier costs comparable to higher classes, suggesting heterogeneity in patient complexity and resource utilization [9], [10], [11], [12].

Beyond inpatient class differences, systematic variation was also evident across regions. Hospitals located in Java, particularly Bandung and Yogyakarta, consistently reported higher unit costs compared to facilities in Sumatra and Sulawesi. These differences are largely explained by higher labor costs, regional wage indices, and greater reliance on consumables in metropolitan settings. By contrast, hospitals in Lampung and Central Sulawesi reported comparatively lower costs, reflecting local economic and managerial differences.[9], [10], [13], [14].

Differences were also shaped by hospital type and ownership. Private maternity hospitals and type B facilities generally reported higher unit costs than type C hospitals, due to greater specialization, reliance on obstetricians and anesthesiologists, and higher overhead expenses. Public hospitals, on the other hand, often benefited from government subsidies and broader cross-subsidization mechanisms, which moderated their reported unit costs [15], [16], [17], [18].

Temporal patterns further highlighted the influence of inflation and rising input prices. Studies conducted before 2020 generally reported lower unit costs compared with those after 2020. Adjusted to 2024 IDR, the gap between INA-CBGs tariffs and real costs widened, with tariffs covering only 46–75% of actual expenditures. This demonstrates how persistent cost inflation, compounded by the COVID-19 pandemic, has intensified deficits in hospital financing and underscores the need for regular tariff adjustments [13], [14].

B. Variation in Hospital Cost Structures and Implications for National Health Financing

Hospital financing structures in Indonesia are significantly influenced by service orientation, hospital type, ownership status, and geographic location. Specialist private hospitals, such as maternity and child hospitals (RSIA), tend to incur higher costs due to more intensive and specialized human resource utilization, including obstetricians and

perinatologists. In contrast, public hospitals often demonstrate greater efficiency in managing overhead costs, supported by government budgets (regional and national) and more integrated organizational structures within the public service system. The variation between direct and indirect costs reflects differing levels of managerial efficiency across hospitals. Facilities with more advanced hospital information systems typically exhibit more efficient workload distribution and better cost control mechanisms.[17], [18].

Differentials in costs were consistently larger in urban and type B/private hospitals compared to rural or type C, driven by higher labor costs and service intensity. Inflation-adjusted trends demonstrate rising deficits from 2020 onwards, mirroring input price inflation not reflected in fixed tariffs. This implies that supply-side determinants (manpower, consumables, case-mix) and macroeconomic variables (inflation, regional wage indices) should be included in tariff updates, as opposed to assigning all deficits to reimbursement shortfall [13], [14], [18].

Differences in human resource costs also highlight variations in compensation policies and regional cost pressures. Hospitals located in urban areas such as Bandung face higher financial burdens compared to those in rural settings, driven by factors such as higher regional minimum wages, increased cost of living, and greater patient expectations for service quality. These variations in cost are not just the result of tariff inadequacy but are also masked by differences in managerial efficiency, government subsidies, and workload distribution across centers.[19] These disparities indicate that hospitals with high specialization levels may become financially vulnerable due to dependency on specific categories of healthcare workers. This vulnerability can have serious implications if not offset by subsidies or claim tariffs that accurately reflect actual service costs. In response, hospital management may be pressured to implement cost-saving measures, which in some cases could lead to compromised service quality or increased workloads for healthcare staff.[20], [21] These findings mirror a broader reality in low- and middle-income countries (LMICs), where fixed reimbursement systems fail to follow real cost inflation, compromising both hospital sustainability and equity of access to services.[22] Similar findings have been reported in Pakistan and the Philippines, where specialist hospitals under reimbursement constraints faced trade-offs between cost savings and care quality [23].

For patients, such cost disparities may result in inequitable access to quality healthcare, especially for those relying on hospitals contracted by the National Health Insurance (BPJS Kesehatan). At the same time, BPJS faces challenges in setting fair and proportional claim rates when hospital costing data are inconsistent or outdated. Gaps in data collection timelines further highlight the impact of inflation and rising healthcare service costs,

underscoring the need for regular tariff adjustments to reflect current economic conditions. Without such reforms, Indonesia's health financing system risks stagnation in efficiency and growing inequalities across regions and types of healthcare facilities [24] Global research has emphasized the need for dynamic health financing systems that are regularly adjusted for inflation, service innovation, and demographic shifts [25].

C. International Comparison & Critical Synthesis

Relative to international evidence, the findings in Indonesia higher unit costs in urban, higher-level facilities and rising over time are consistent with those in other low- and middle-income countries. ABC research in Rwanda illustrates that cesarean unit costs are driven by length of stay, complication rates, and distribution of staff time, and that these drivers explain much of the inter-facility difference observed between district and rural hospitals.[10] Similarly, Cambodian costing studies found that public hospitals incur repetitive reimbursement shortfalls when tariffs do not reflect real resource use, particularly in more complicated case hospitals or where consumables and pharmaceuticals make up a large share of costs.[26] Turkish and Malaysian evidence also show that tertiary or greater-level hospitals (and urban environments) have consistently higher unit cost for cesarean section due to more specialist input, greater consumption of consumables, and higher overheads [27].

Comparable studies in Vietnam also note that regional economic differences and service mix are key determinants of cost variation[28]. There are two policy implications of these international comparisons. First, tariff–cost variation in Indonesia will not be caused by reimbursement policy itself: supply-side determinants (case mix, workload of staff, intensity of drugs/consumables, and length of stay) and setting (urban wage levels, hospital ownership) are important confounders to be adjusted for in any tariff revision [10], [26]. Second, international ABC implementations show that while activity-based methods can illuminate unit-cost drivers and advise tariff construction, realization needs to take careful account of local capacity and data systems ABC research specifically reports demands for sustained time-motion data, skilled costing staff, and governance arrangements to ensure data quality and utility to purchasers [10], [29].

For Indonesia, these lessons imply a twin strategy: (a) refine INA-CBGs by introducing case complexity adjustments, facility level, and regional wage indices in lieu of a unified national tariff; and (b) pilot ABC implementations in a purposive sample of hospitals (urban tertiary, rural district, private maternity) to design operational templates and estimate scaling-up costs of a national ABC dashboard. Pilots should particularly collect time-based

resource data and include an implementation analysis (cost, data governance, training needs of the workforce) so that scale-up decisions are evidence-based and budgeted. The experiences reported here from Rwanda, Cambodia, Turkey, Malaysia and Vietnam provide both empirical justification for these steps and pragmatic caution concerning the resource and governance investments entailed [10], [27], [28], [29]. Rather than roll-out at a country level, the concept of an ABC costing dashboard at a national level needs to be piloted in sample hospitals (urban tertiary, rural district, private maternity) to assess feasibility, governance requirements, and costs. Learning from these pilots can then be employed to inform incremental scale-up if found to be cost-reducing and administratively viable [10], [26], [30], [31].

D. Policy and Financing Implications

This chronic gap between the price of hospital units and INA-CBGs tariffs poses a serious threat to the sustainability of Indonesia's National Health Insurance (JKN). Deficits per CS case are also routinely faced by hospitals, as seen in the case of Kolonodale District Hospital with a deficit of IDR 110,530,344 [5], [32]. In order to cover such deficits, facilities resort to internal cross-subsidization or government subsidies, both limited and unsustainable.

Underfunding can potentially force hospitals to reduce quality by rationing medical inputs, reducing the workforce, or increasing workload. Physicians, particularly obstetricians, may experience compensation shortfalls, which prompt them to shift to the private sector. These imbalances, if continued, have the potential to weaken public hospitals' capacity, restrict BPJS patients' access, and impose inequity in maternal health care [33], [34], [35], [36], [37]. Such gaps in reimbursement have also been evidenced in Cambodia and Rwanda, where it was difficult to maintain CS services when tariffs were not cost appropriate [26].

E. Tariff-Cost Disparities and the Threat to Financial Sustainability of Hospitals

The significant gap between INA-CBGs tariffs and the actual cost of Cesarean Section (CS) procedures poses a serious threat to the financial sustainability of hospitals contracted by BPJS Kesehatan. Hospitals experiencing persistent deficits are often forced to cover the shortfall using internal resources, which may lead to service cutbacks, increased pressure on human resources, or a decline in the overall quality of care. This imbalance highlights the urgent need for tariff reform based on cost-of-service principles that consider case complexity and geographic context. For example, Kolonodale District Hospital reported a

financial deficit of IDR 110,530,344 for CS cases, with unit costs for VIP, Class I, and Class III patients recorded at IDR 7,131,200, IDR 6,293,944, and IDR 6,148,056, respectively [5], [32]. Similar challenges have been reported in Cambodia, where cesarean section costs in public hospitals reached USD 470 per case, surpassing typical reimbursement rates and threatening service continuity [26]

This tariff discrepancy also affects physician compensation, particularly for specialists performing CS procedures. Evidence suggests that specialist fees vary according to patient class, yet the fixed INA-CBGs tariffs often fails to reflect the real costs incurred by hospitals, including labor expenses. This mismatch contributes to compensation disparities that may incentivize physician migration to the private sector, where remuneration is typically higher. Furthermore, the absence of standardized cost accounting practices across hospitals results in inconsistent pricing and tariffs policies. Some hospitals apply uniform tariffs across all inpatient classes without accounting for variations in workload and resource utilization, creating opportunities for unethical practices such as upcoding, unbundling, and phantom billing, which undermine the integrity of the national health insurance system [33], [34], [35].

Furthermore, the consistent underpricing of CS procedures by INA-CBGs tariffs, compared to actual service costs, could have severe implications for the long-term sustainability of Indonesia's healthcare system. Hospitals may be forced to reduce costs in ways that compromise service quality, such as limiting the use of high-quality medical supplies or reducing staff availability, ultimately jeopardizing patient safety.[7] Tariff imbalances may also restrict healthcare access, particularly in small or remote private hospitals, which may limit services for BPJS-covered patients or withdraw from the BPJS network altogether. Public hospitals are particularly vulnerable, often facing severe financial strain from budget deficits that can delay salary payments, hinder operations, and disrupt facility maintenance, especially in regions with limited local government funding. These challenges underscore the need for a more accurate and equitable INA-CBGs tariff revision to support the quality, accessibility, and sustainability of health services across Indonesia [36], [37].

Although the cost of Caesarean Section procedures in Indonesia remains relatively competitive compared to ASEAN countries such as Vietnam, Thailand, and Malaysia, the INA-CBGs financing structure creates significant disparities because it does not reflect the actual cost of services. Several public hospitals, such as RSIA Kota Bandung, Anutapura General Hospital in Palu, and Kolonodale Regional Hospital, have reported deficits amounting to millions of rupiah per case, particularly for Class I to Class III patients.[32], [38] In contrast, surpluses recorded by private hospitals do not necessarily indicate

efficiency. These may instead reflect strategies to limit resource input, such as reducing the number of specialist physicians. Unlike Malaysia, which employs a more adaptive subsidy and tariff structure, hospitals in Indonesia, particularly public hospitals, are more vulnerable to financial strain due to the fixed INA-CBGs tariffs because they must cover cost gaps from internal budgets. This disparity poses a risk to service quality, limits access for BPJS patients, and weakens equity within the national healthcare system [26], [39].

F. Strengthening Quality and Cost Control in Cesarean Section Services

Strengthening quality control and cost containment (KMKB) is a critical component in ensuring that adjustments to INA-CBGs tariffs do not lead to an increase in moral hazard, such as the unjustified use of upcoding without medical indication. Some hospitals have acknowledged a tendency to perform Cesarean Sections (CS) in cases that are medically eligible for vaginal delivery. This trend may occur in the absence of effective oversight of financial incentives embedded in the claims system. On the other hand, public education on the importance of opting for normal delivery in the absence of medical necessity also plays a role in reducing unnecessary demand.

G. Strengths and Limitations

The review has both strengths and weaknesses. To our knowledge, it is the first systematized summation of the cost of Cesarean Section (CS) in Indonesian hospitals using INA-CBGs tariffs. By focusing on the Activity-Based Costing (ABC) method, we tried to ensure methodological consistency and reduce heterogeneity in cost estimation. The representation of different types of hospitals and geographical regions gave initial indications of contextual influences on cost variability. Furthermore, the use of national inflation adjustments improved comparability over time, which in local studies has so far been unusual.

However, a number of limitations need to be considered. Studies included were limited in number, at 12, and varied methodologically. Limiting inclusion to ABC-based studies can potentially limit the scope for generalizability, and the majority used retrospective cost data that can overestimate or underestimate costs. Literature searches were primarily dependent on Google Scholar, Garuda, and DOAJ, but most of the studies were obtained from Google Scholar since the limited comparable studies are available, and there were no Indonesian hospital costing studies available in PubMed and Scopus. This would have increased the risk of failing to obtain relevant grey literature. Finally, while national inflation adjustments were possible, price and resource utilization regional variations

cannot be adjusted for. These are recognized as the reasons for which standardized costing guidelines, a national hospital cost registry, and more frequent publication of higher-quality costing studies in Indonesia are needed.

Conclusion

INA-CBGs tariffs were found to account for 46–75% of inflation-adjusted cesarean section costs in 12 reviewed studies. While this suggests potential underfunding in the majority of Indonesian hospitals, the evidence remains thin, disparate, and largely confined to ABC-based costing. Policy implications should therefore be made with caution. Staged tariff revision anchored on standardized costing guidelines to the hospital, pilot implementation of national costing dashboards, and enhanced financial governance could perhaps be a more enduring path.

There is a need for future research to confirm the evidence base, for example, cost-effectiveness analysis between standard CS and Enhanced Recovery After Caesarean Surgery (ERACS), hospital costing audits on standardized ABC procedures, and development of integrated digital costing and reporting tools. There will be a need for interdisciplinary collaboration between health economics, accounting, data science, and policy to build strong expenditure projections and provide reliable inputs for evidence-based tariff setting by BPJS and Ministry of Health.

Conflict of Interest

The authors should declare that there is no conflict of interest.

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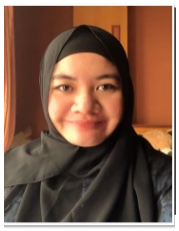
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