International Journal of Health Science (IJHS)

E-ISSN: 2827-9603
P-ISSN: 2827-959X

Research Article

Direct Cost Analysis of Hypertension in National Health Insurance Participants for the Advanced Level Healthcare in Indonesia (Analysis of BPJS Kesehatan Sample Data 2023)

Akhmal Raziq Kharazi [1*], Bambang Budi Raharjo [2]

[1] Universitas Negeri Semarang, Kota Semarang, Indonesia; e-mail : akhmalraziqkarazi@gmail.com
[2] Universitas Negeri Semarang, Kota Semarang, Indonesia; e-mail : bambangbr@mail.unnes.ac.id
* Corresponding Author : Akhmal Raziq Kharazi

Abstract: In 2023, WHO states one-third of individuals aged 30-79 have hypertension, only 42% receive treatment, and few of just 20% that receive it are controlled. Indonesia's 2020-2022 Health Profile shows an annual increase of catastrophic disease burdened by the National Health Insurance (NHI), particularly for outpatient and inpatient advanced-level care. NHI's Statistics of 2020-2021 reports increased utilization of healthcare services for hypertension-related visits from 2020 to 2021. This condition may cause an increase of economic burden to the healthcare system and pose financial risk for its participants. This study examines factors influencing the direct costs of hypertension-related visits among NHI participants at an advanced level. This study uses an analytical observational quantitative approach with a cohort design, utilizing the 2023 BPJS Kesehatan Sample Data. The total sampling method resulted in a total of 26.776 participants and 102.748 visits that were analyzed, with weighted results representing 2.207.606 participants and 8.583.700 visits. Data analysis included univariate, bivariate (simple logistic regression), and multivariate (multiple logistic regression) methods. Significant factors (p-value<0.05) affecting outpatient costs include age, regional type, administrative status, health facility ownership, and health facility type. Inpatient costs are influenced (p-value<0,05) by gender, regional type, class entitlement, health facility ownership, health facility type, comorbidities, length of stay, and severity. The study recommends evaluating advanced level healthcare tariff policies to minimize economic disparities in healthcare access across Indonesia.

Keywords: BPJS Kesehatan; Direct Cost; Hypertension; Indonesia; National Health Insurance.

1. Introduction

According to the World Health Organization (WHO, 2023), hypertension is defined as a condition in which blood vessel pressure rises above the normal threshold (systolic ⩾ 140 mmHg and diastolic ⩾ 90 mmHg). The persistence of this condition can increase the risk of health complications such as kidney failure, stroke, and heart attack [1,2]. In 2023, WHO estimated that 1.28 billion people suffer hypertension worldwide, with 46% unaware of their condition, and only 42% of those that are diagnosed receive treatment. Even among those who receive treatment, only 1 in 5 has their condition under control [1]. The Global Report on Hypertension shows that the prevalence of hypertension among the global population aged 30–79 years in 2019 was 33%—or 1 in 3 people—while in Indonesia, it reached 40% [3].

According to The Indonesian Law No. 17 of 2023 on Health, the government is responsible for ensuring that the public has the ability to access quality, safe, affordable, and equitable healthcare services and resources [4]. This is in accordance with The Indonesian Law No. 24 of 2011 on BPJS Kesehatan, which designates it as the legal entity responsible for managing national health insurance [5]. The Indonesian Minister of Health Regulation No. 28 of 2014 on Guidelines for the Implementation of National Health Insurance (NHI) guarantees the management of chronic diseases, such as hypertension, through preventive measures via risk screening and optimal treatment through a tiered referral system based on quality and cost-control principles [6].

Received: April 17, 2025
Revised: May 20, 2025
Accepted: June 29, 2025
Published: July 2025
Curr. Ver.: July 2025

According to the Indonesia Health Profile of 2020, the percentage of NHI utilization for Primary Outpatient Care (RJTP), Advanced Outpatient Care (RJTL), and Advanced Inpatient Care (RITL) was 78.3%, 19.2%, and 2.5%, respectively, of total healthcare utilization. The corresponding cost distribution was 15.5%, 29.7%, and 53.3%, with the remainder allocated to Primary Inpatient Care (RITP) at 1.2% and Preventive & Promotional Services at 0.3% [7]. The Indonesia Health Profile of 2021 showed changes in utilization rates for RJTP, RJTL, and RITL, recorded at 79.8%, 18.2%, and 2.0%, respectively. Meanwhile, the cost burden shifted to 16.3%, 31.1%, and 51.2%, with RITP at 1.0% and Preventive & Promotional Services at 0.3% [8]. Based on the Indonesia Health Profile 2022, the composition of utilization for RJTP, RJTL, and RITL was 78.54%, 19.08%, and 2.39%, with the respective costs at 13.8%, 30.47%, and 54.98%, while RITP accounted for 0.95% and Preventive & Promotional Services for 0.43% [9]. This comparison indicates a lower utilization frequency for advanced level of healthcare for the NHI Participants compared to the primary lever of healthcare, yet its implementation poses a significant financial burden on the health system.

According to the NHI Statistics Book 2016–2021 published by BPJS Kesehatan and USAID, NHI membership has increased yearly, accompanied by increased utilization of hypertension-related healthcare services. Between 2020 and 2021, RJTP cases rose from 8,862,996 cases in 2020 to 9,381,142 cases in 2021. However, RITP utilization for hypertension management declined from 37,127 cases in 2020 to 24,649 cases in 2021. At the advanced level, RJTL visits decreased from 227,052 in 2020 to 206,354 in 2021, along with a decline in RITL admissions from 68,430 to 51,184 cases [10]. This demonstrates a decrease in the number of visits for services other than RJTP. Disease distribution data indicate that hypertension-related healthcare services remain prevalent across all healthcare service types, whether at the primary or advanced level and whether hypertension is a primary or secondary diagnosis.

According to the Indonesia Health Profile, the financial burden of catastrophic diseases covered by NHI has increased over the years, reaching IDR 17,054,560,531,865 (17.05 trillion) in 2020 [7], IDR 17,915,226,840,578 (17.91 trillion) in 2021 [8], and IDR 24,059,402,551,665 (24 trillion) in 2022 [9]. Meanwhile, data from BPJS Kesehatan and the Indonesian Ministry of Health (2019) indicate that hypertension-related healthcare costs were IDR 2.8 trillion in 2016, rising to IDR 3 trillion in 2017 and 2018 [11].

The increasing cost of hypertension treatment poses the risk of NHI funds going further into deficit and increases the financial risks for NHI participants suffering from hypertension. Therefore, this study aims to identify the factors influencing the direct costs of advanced-level hypertension visits among National Health Insurance (JKN) participants in Indonesia.

2. Preliminary

2.1 Hypertension

The WHO and CDC defines hypertension as a condition indicated by the increase in systolic/diastolic blood pressure and it persists above the normal threshold of 140/90 mmHg, potentially leading to various health complications [1,2]. Approximately 1.28 billion people worldwide suffer from hypertension, with the prevalence rate of 33% among those aged 30–79 years [1]. According to Iqbal and Jamal, hypertension does not have a specific etiology [12], but is driven by dysfunctions in bodily systems and organs [13].

Hypertension can be classified based on systolic and diastolic blood pressure levels, as outlined in the 7th Report of the Joint National Committee, which categorizes it as follows: Normal (<120/<80), Prehypertension (120–139/80–89), Stage I Hypertension (140 – 159/90 – 99), and Stage II Hypertension (≥160/≥100) [15]. The International Society of Hypertension (ISH) [14] and the Indonesian Ministry of Health [15] further classify hypertension based on severity as follows: Optimal (<120/<80), Normal (120 – 129/80 – 84), High-Normal (120 – 139/85 – 89), Stage I Hypertension (140 – 159/90 – 99), Stage II Hypertension (160 – 179/100 – 109), Stage III Hypertension (≥180/≥110), and Isolated Systolic Hypertension (≥140/<90). Additionally, hypertension can also be classified based on its complications according to the ICD-10 coding system (WHO, 2019), as follows: primary hypertension (I10), hypertensive heart disease (I11), hypertensive kidney disease (I12), hypertensive heart and kidney disease (I13), and secondary hypertension (I15) [16].

2.2 National Health Insurance

Based on Indonesian Law No. 24 of 2011, the Social Security Administering Body for Health (BPJS Kesehatan) was established as a legal entity responsible for managing the health insurance [5]. This is in accordance with Indonesian Law No. 40 of 2004 on the National Social Security System (SJSN), where BPJS Kesehatan provides health insurance under the principles of social welfare and equity through the implementation of the National Health Insurance (NHI) for all Indonesian citizens [17].

According to The Indonesian Minister of Health Regulation (Permenkes) No. 28 of 2014 on the Implementation of the National Health Insurance (NHI), the provision of healthcare services to its participants must be carried out through the referral system in an effective and efficient manner, whilst also adhering to the principles of quality and cost control [18]. NHI participants are entitled to receive healthcare services at the primary level (RITP and RJTP) as well as at the advanced level (RJTL and RITL) [6].

Based on The Indonesian Minister of Health Regulation (Permenkes) No. 76 of 2016, the provision of healthcare services for NHI participants at the advanced level is conducted using the INA-CBGs system, which bundles service costs based on both medical and non-medical services provided by FKRTL (Referral Advanced Care Health Facilities) [18]. According to Permenkes No. 3 of 2003, the INA-CBGs tariff structure is determined by the type of INA-CBGs code, which includes disease groups, healthcare service levels, diagnoses, severity levels, specific service codes, regional classification, health facility type, health facility ownership, and inpatient class entitlement [19].

2.3 Cost of Illness Study

According to Jefferson et al. in 2000 as cited by Jo in 2014, the burden of a disease can be measured economically through a cost-of-illness (COI) study, where it can be used to analyse and describe the costs associated with the disease [20]. Based on the CDC (2024), COI study categorizes the cost of healthcare into three main components: direct costs, indirect costs, and intangible costs [21]. Jo also defines direct costs as expenses incurred by the healthcare system or individual patients to obtain medical and non-medical services for treatment. Meanwhile, indirect costs are often subjective, referring to the hidden expenses or losses faced by patients due to suffering from a disease [20].

2.4 Previous Study Findings

Several previous studies have analyzed the factors contributing to risk factors and their relationship with the cost of hypertension. According to Franco et al. in 2022, hypertension can lead to metabolic disorders that cause hormonal imbalances. Hypertension can also result in ophthalmic complications [22], where high blood pressure increases the risk of retinal blood vessel rupture [23]. In 2008, the cost of ocular hypertension in the United States rose with age, as well as the progression and severity of glaucoma [24].

Nichols et al. (2023) stated that cardiovascular, renal, and metabolic (CRM) complications specifically increase healthcare costs [25] due to longer and more complex hospital stays [28]. This aligns with findings by Adane et al. at Gondar University Hospital in 2020, where hypertension costs were significantly associated with inpatient services ($p<0.001$) and comorbidities ($p<0.004$) [26]. According to Zawudie et al. (2020), predictors of the cost of illness for hypertension include primary education level, household size, hospital distance, caregiver availability, and hypertension severity [27]. At Gondar University Hospital in Ethiopia, high socioeconomic status, secondary education and above, and government employment were found to be associated with direct hypertension costs [26]. These findings are consistent with those from a private hospital in Yogyakarta, where inpatient length of stay was associated with direct hypertension costs [28] (Baroroh & Maghfiroh, 2023). Similarly, Yuliastuti et al. found that comorbidities, length of stay, and inpatient class entitlements influenced total hypertension costs at Sleman Regional Hospital in Yogyakarta during 2024 [29].

A study by Ying et al. in 2020 at China identified differences in healthcare costs between urban and rural areas [30], this is due to variations in population characteristics such as government schemes, availability of healthcare professionals, health literacy, access to information, and disease prevalence, which directly contribute to regional healthcare cost disparities [31, 32].

3. Proposed Method

This study is a quantitative observational analytic research with a cohort design, utilizing secondary data from the 2023 BPJS Kesehatan Sample Data. This dataset contains information on participant enrollment and the cost of advanced-level hypertension claims in Indonesia verified by BPJS Kesehatan. The study is conducted from January to March 2025.

Sampling is carried out using a total sampling technique based on inclusion criteria, which consist of NHI participant visits with a primary or secondary diagnosis of hypertension (ICD-10 codes: I10–I15) and utilization of advanced healthcare services within the period of January to December 2022. Exclusion criteria include visits by NHI participants who are inactive, deceased, have incomplete data, or do not have a hypertension diagnosis in either the primary or secondary diagnosis field.

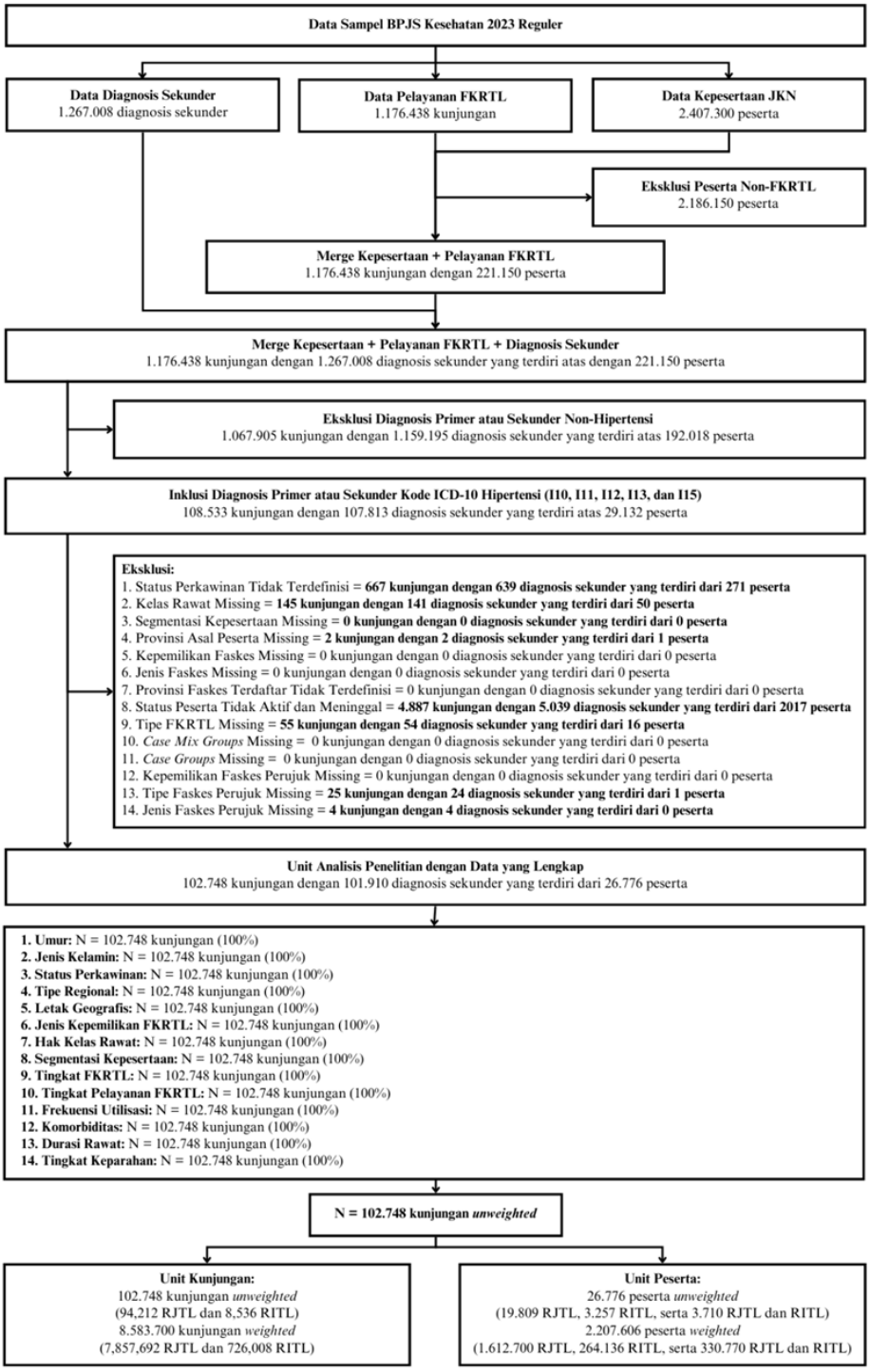

Figure 1. Total Sampling Flowchart.

This study designates visitation of NHI participant as the unit of analysis, resulting in a total of 102,748 visits (94,212 outpatient advanced care [RJTL] and 8,536 inpatient advanced care [RITL]), representing 8,583,700 visits (7,857,692 RJTL and 726,008 RITL) in the population. This study adheres to ethical research principles in health sciences, as evidenced by the Ethical Clearance Certificate No. 784/KEPK/FK/KLE/2025 issued by the Health Research Ethics Committee of UNNES.

4. Results and Discussion

This study utilizes STATA Version 17 to analyse the data with the confidence level of 95 percent. Data is analyzed based on visit type using simple logistic regression for partial (bivariate) analysis and multiple logistic regression for simultaneous (multivariate) analysis with weighted data to account for the survey design. Variables that undergo multivariate analysis were selected under the criteria of overall p-value<0.25, certain variables did not meet this criteria and as such, were excluded from multivariate analysis.

4.1. Univariate Analysis

Table 1. Distribution of Direct Health Cost of Hypertension NHI Visits at The Advanced Level of Care in Indonesia.

Variables	Mode	Median (Min- Max)	Total
Total Advanced Care Cost	**Rp190.400**	**Rp190.400 (84.400-397.000.000)**	**Rp5.750.000.000.000**
Outpatient Advanced Care Cost	Rp190.400	Rp190.400 (84.400-8.580.500)	Rp1.820.000.000.000
Inpatient Advanced Care Cost	Rp1.811.400	Rp3.711.900 (927.775-397.000.000)	Rp3.930.000.000.000

Based on the table above (Table 1), the total cost of hypertension at the Advanced Level of Care in Indonesia amounts to 5.75 Trillion IDR. Segregated by its level of care, the outpatient care at advanced level (RJTL) costs 1.82 Trillion IDR, whilst inpatient care at advanced level costs 3.93 Trillion IDR. The total cost of hypertension at the advanced level is proportionally higher for inpatient care, even though the amount of utilization by NHI Participants is far lower than outpatient care. Due to these significant differences, this study analyzes the direct cost of hypertension, outpatient and inpatient, separately and categorizes it by using the median cost value of each level of care.

Table 2. Characteristics of NHI Participants on Hypertension Visits at The Advanced Level of Care in Indonesia

Variables	Visit Count			
	Outpatient Visit		Inpatient Visit	
	F	%	F	%
Age				
>65 years old	2,372,423	30.19%	192,158	26.47%
15-64 years old	5,458,868	69.47%	531,997	73.28%
<15 years old	26,402	0.34%	1,853	0.26%
Sex				
Male	3,334,075	42.43%	328,343	45.23%
Female	4,523,618	57.57%	397,665	54.77%
Marital Status				
Single/Unmarried	486,230	6.19%	51,232	7.06%
Married	6,542,929	83.27%	589,630	81.22%
Divorced	828,534	10.54%	85,146	11.73%
Regional Type				
Regional 1	5,136,966	65.37%	409,616	56.42%
Regional 2	1,231,870	15.68%	93,033	12.81%
Regional 3	704,336	8.96%	113,216	15.59%
Regional 4	493,606	6.28%	60,525	8.34%
Regional 5	290,915	3.70%	49,619	6.83%
Healthcare Facility Region Administration Status				
City	4,029,378	51.28%	338,598	46.64%
Regency	3,828,315	48.72%	387,410	53.36%

Class Entitlement				
Class 1	0	0.00%	206,777	28.48%
Class 2	0	0.00%	100,080	13.79%
Class 3	7,857,693	100.00%	419,150	57.73%
Healthcare Facility Ownership				
Vertical	270,739	3.45%	46,198	6.36%
Provincial Government	560,805	7.14%	63,408	8.73%
City/District Government	1,811,485	23.05%	233,801	32.20%
POLRI	122,497	1.56%	11,499	1.58%
Ground Force (TNI AD)	190,388	2.42%	26,857	3.70%
Navy Force (TNI AL)	17,574	0.22%	6,296	0.87%
Air Force (TNI AU)	34,725	0.44%	1,920	0.26%
State-owned Company (BUMN)	154,283	1.96%	11,010	1.52%
Private	4,695,197	59.75%	325,017	44.77%
Participant Segmentation				
Non-Worker (BP)	1,269,967	16.16%	88,996	12.26%
PBI APBN	1,355,511	17.25%	204,568	28.18%
PBI APBD	895,660	11.40%	108,947	15.01%
PBPU	2,263,961	28.81%	153,379	21.13%
PPU	2,072,595	26.38%	170,119	23.43%
Healthcare Facility Type				
Class A Hospital	271,659	3.46%	43,366	5.97%
Class B Hospital	1,035,124	13.17%	132,944	18.31%
Class C Hospital	1,493,513	19.01%	159,797	22.01%
Class D Hospital	222,096	2.83%	33,580	4.63%
Private Hospital Equivalent to Type A	14,759	0.19%	821	0.11%
Private Hospital Equivalent to Type B	607,010	7.73%	45,579	6.28%
Private Hospital Equivalent to Type C	2,846,318	36.22%	168,632	23.23%
Private Hospital Equivalent to Type D	714,348	9.09%	64,448	8.88%
Military. Police Hospital Class I	16,384	0.21%	7,121	0.98%
Military. Police Hospital Class II	135,838	1.73%	23,418	3.23%
Military. Police Hospital Class III	155,770	1.98%	9,863	1.36%
Military. Police Hospital Class IV	56,790	0.72%	6,172	0.85%
Specialized Surgical Hospital	26,423	0.34%	290	0.04%
Specialized Maternal and Child Hospital	24,349	0.31%	1,689	0.23%
Specialized Cardiac Hospital	40,345	0.51%	5,917	0.82%
Specialized Psychiatric Hospital	8,308	0.11%	4,515	0.62%
Specialized Oncology Hospital	2,128	0.03%	798	0.11%
Specialized Eye Hospital	12,184	0.16%	2,131	0.29%
Specialized Pulmonary Hospital	13,869	0.18%	3,496	0.48%
Specialized Orthopedic Hospital	90	0.00%	173	0.02%
Other Specialized Hospital	159,005	2.02%	11,258	1.55%
Non-Provider Emergency Hospital	1,383	0.02%	0	0.00%
Utilization Frequency				
Low	1,228,696	15.64%	390,801	53.83%
High	6,628,997	84.36%	335,207	46.17%
Comorbidity				
Multicomorbidity	95,117	1.21%	65,101	8.97%
Comorbid	7,574,214	96.39%	599,747	82.61%
None	188,361	2.40%	61,160	8.42%
Length of Stay				
Short	7,857,693	100.00%	406,618	56.01%
Long	0	0.00%	319,390	43.99%
Severity Level				
Outpatient	7,857,693	100.00%	0	0.00%
Mild	0	0.00%	453,206	62.42%
Moderate	0	0.00%	201,517	27.76%
Severe	0	0.00%	71,285	9.82%

Overall, the univariate analysis shows similarities in the characteristics of NHI participants who utilize advanced-level hypertension visits. Result shows that both outpatient (RJTL) and inpatient (RITL) visits are predominantly utilized by the productive age group (15-64 years old) (69.47% and 73.28%), females (57.57% and 54.77%), married individuals (83.27% and 81.22%), those in regional type 1 (65.37% and 56.42%), private ownership (59.75% and 44.77%), private hospital equivalent to type C (23.23% and 36.22%), and those with comorbidities (96.39% and 82.61%).

Differences in characteristics are found in health facility region administration status, where outpatient visits are predominantly done in urban areas (51.28%), while inpatient visits are more common in regencies (53.36%). In terms of participant segmentation, outpatient visits are mostly utilized by PBPU participants (28.81%), whereas inpatient visits are primarily used by PBI APBN participants (28.18%). It is also known that outpatient services are fully provided according to class 3 care entitlement (100%), whereas inpatient services are mostly only partially provided under class 3 (57.73%). Specifically for inpatient visits, the majority of NHI participants undergo inpatient care for a short duration (56.01%), with a mild severity level (62.42%).

4.2 Bivariate and Multivariate Analysis of Advanced Level Outpatient Care Visits

Place figures and tables at the top and bottom of columns. Avoid placing them in the middle of columns. Large figures and tables may span across both columns. Figure captions should be below the figures; table heads should appear above the tables. Insert figures and tables after they are cited in the text. Use the abbreviation "Fig. 1", even at the beginning of a sentence.

Table 3. Statistic Analysis Results for the Factors of Direct Health Cost of a Hypertension Outpatient Care Visit

Variable	Direct Cost of Hypertension		P-value	
	Low (<= Median)	High (> Median)	Partial Analysis	Simultaneous Analysis
	F	F		
Age			**0.1758**	**0.0047**
>65 years old	1,658,585	713,838		
1564 years old	3,611,223	1,847,645	0.084	0.004
<15 years old	21,236	5,165	0.558	0.276
Sex			**0.1050**	**0.1540**
Male	2,182,347	1,151,727		
Female	3,108,697	1,414,921	0.105	0.154
Marital Status			**0.2190**	**0.3316**
Single/Unmarried	299,115	187,115		
Married	4,427,359	2,115,570	0.086	0.196
Divorced	564,571	263,964	0.172	0.951
Regional Type			**0.0000**	**0.0000**
Regional 1	3,927,094	1,209,872		
Regional 2	583,139	648,731	0.000	0.000
Regional 3	411,335	293,001	0.000	0.000
Regional 4	264,286	229,320	0.000	0.000
Regional 5	105,190	185,725	0.000	0.000
Healthcare Facility Region Administration Status			**0.0000**	**0.0178**
City	2,276,019	1,753,359		
District	3,015,026	813,289	0.000	0.018
Healthcare Facility Ownership			**0.0000**	**0.0000**
Vertical	49,486	221,253		
Provincial Government	404,694	156,111	0.000	0.005
City/District Government	1,587,262	224,224	0.000	0.000
POLRI	109,747	12,750	0.000	0.446
Ground Force (TNI AD)	172,684	17,704	0.000	0.486
Navy Force (TNI AL)	10,175	7,399	0.000	0.053
Air Force (TNI AU)	34,074	651	0.000	0.500
State-owned Company (BUMN)	112,527	41,756	0.000	0.203
Private	2,810,397	1,884,801	0.000	0.020
Participant Segmentation			**0.0000**	**0.5188**
Non Worker (BP)	839,831	430,136		
PBI APBN	1,049,312	306,199	0.000	0.436

PBI APBD	583,935	311,725	0.855	0.488
PBPU	1,547,142	716,819	0.423	0.125
PPU	1,270,825	801,770	0.119	0.387
Healthcare Facility Type			**0.0000**	**0.0000**
Class A Hospital	10,029	261,630		
Class B Hospital	842,963	192,161	0.000	0.000
Class C Hospital	1,204,150	289,363	0.000	0.000
Class D Hospital	201,790	20,306	0.000	0.000
Private Hospital Equivalent to Type A	41	14,718	0.015	0.584
Private Hospital Equivalent to Type B	5,836	601,174	0.000	0.335
Private Hospital Equivalent to Type C	1,848,863	997,454	0.000	0.000
Private Hospital Equivalent to Type D	660,315	54,032	0.000	0.000
Military. Police Hospital Class I	178	16,205	0.127	0.087
Military. Police Hospital Class II	130,041	5,797	0.000	0.000
Military. Police Hospital Class III	144,224	11,547	0.000	0.000
Military. Police Hospital Class IV	51,851	4,939	0.000	0.000
Specialized Surgical Hospital	11,255	15,168	0.000	0.000
Specialized Maternal and Child Hospital	15,897	8,452	0.000	0.000
Specialized Cardiac Hospital	10,620	29,726	0.000	0.000
Specialized Psychiatric Hospital	5,187	3,121	0.000	0.000
Specialized Oncology Hospital	0	2,128		
Specialized Eye Hospital	3,286	8,898	0.000	0.000
Specialized Pulmonary Hospital	9,593	4,276	0.000	0.000
Specialized Orthopedic Hospital	0	90		
Other Specialized Hospital	133,547	25,458	0.000	0.000
Non-Provider Emergency Hospital	1,378	6	0.000	0.000
Utilization Frequency			**0.3314**	**-**
Low	843,002	385,694		
High	4,448,043	2,180,954	0.331	
Comorbidity			**0.4410**	**-**
Multicomorbidity	65,344	29,773		
Comorbid	5,106,916	2,467,298	0.768	
None	118,784	69,577	0.316	

Based on Table 3, this study result shows that there is a significant relationship (p-value < 0.05) at the multivariate (simultaneous) level between age, regional type, health facility ownership, and the type of health facility with the direct costs of hypertension during outpatient visits.

The significance of age in this study aligns with Kohli-Lynch et al. in 2022, who found a significant difference in total outpatient hypertension costs among age groups, with the highest costs in the middle-aged group (40-69 years) amounting to US$ 459 million (95% CI: 401 – 524 million), exceeding the elderly group (>70 years) at US$ 164 million (95% CI: 122 – 211 million), and young adults (20-39 years) at US$ 88 million (95% CI: 72 – 105 million) [33]. This is consistent with Biswas et al. in India, where significant difference (p-value < 0.05) was present in average total outpatient medical costs, including medication and laboratory tests, based on age groups, namely 2,317 Rupees for the age group of 15-34 years, 2,526 Rupees for the age group of 35-50 years, and 2,999 Rupees for those over 50 years [34].

The significant cost differences between regional types is supported by Maryani et al. in 2020, where there are significant health disparities among regions in Indonesia, with eastern part of Indonesia (Maluku, North Maluku, West Papua, and Papua) having lower Healthy Family Indicators compared to other regions [35]. This is further backed by Laksono and Sandra in 2020, who stated that childbirth in healthcare facilities in Indonesia is influenced by population density, availability of healthcare personnel, and the number of hospitals [36].

The relationship between health facility ownership and direct outpatient hypertension costs is supported by Pavel et al. in 2016, where differences in direct costs between public and private healthcare facilities in Bangladesh were found to be significant, with outpatient costs at public hospitals being higher than those at private ones, and total outpatient costs (including indirect costs) being higher at public hospitals regardless of income, gender, age, or type of disease [37]. The results of this study are consistent with the cost analysis of hypertension care at City Health Centers in Puducherry, India by Kar et al. in 2018, where there were differences in average direct care costs among types of health facilities: City Health Centers, Other Government Facilities, and Private Clinics/Hospitals (p-value < 0.001). The

highest costs were found in Private Clinics/Hospitals at INR 550 (270 – 780), followed by City Health Centers at INR 214 (198 – 577), and the lowest was Other Government Facilities at INR 211 (188-530) [38]. Based on comparative outpatient cost research by Garg et al. in 2021 at India, there were differences in cost amounts based on the type of ownership of health facilities, where public ownership incurred INR 400, while the private sector was higher at INR 586 for informal private facilities and INR 2,643 for for-profit private facilities [39].

This study found a relationship between the type of healthcare facility and direct outpatient hypertension costs. According to Halasa et al. in 2015, hospital accreditation significantly impacts healthcare services such as completeness of medical records, reduction in repeated ICU admissions, and staff turnover, thereby improving healthcare quality and saving costs in Jordan [40]. This aligns with WHO which in 2022 states that the accreditation process for health facilities contributes to improved operational effectiveness, patient outcomes, and cost reduction [41]. The results of this study are also supported by Hussein et al. in 2017 as cited by Nugroho and Sjaaf in 2019, which states that hospital accreditation positively impacts the improvement of healthcare service quality for patients due to the establishment of multidisciplinary teams to handle diverse clinical services, aligning with the findings of Ng et al. in 2013 [42].

4.3 Bivariate and Multivariate Analysis of Advanced Level Inpatient Care Visits

Table 4. Statistic Analysis Results for the Factors of Direct Health Cost of a Hypertension Inpatient Care Visit

Variable	Direct Cost of Hypertension		P-value	
	Low (<= Median)	High (> Median)	Partial Analysis	Simultaneous Analysis
	F	F		
Age			**0.3754**	**-**
>65 years old	98,314	93,843		
15-64 years old	254,180	277,818	0.193	
<15 years old	1,066	787	0.695	
Sex			**0.0016**	**0.0489**
Male	144,737	183,607		
Female	208,823	188,841	0.002	0.049
Marital Status			**0.5949**	**-**
Single/Unmarried	23,481	27,751		
Married	290,788	298,842	0.546	
Divorced	39,291	45,855	0.961	
Regional Type			**0.0000**	**0.000**
Regional 1	176,072	233,544		
Regional 2	47,512	45,521	0.021	0.401
Regional 3	74,594	38,621	0.000	0.000
Regional 4	25,818	34,706	0.945	0.575
Regional 5	29,563	20,055	0.000	0.033
Healthcare Facility Region Administration Status			**0.0000**	**0.519**
City	127,746	210,852		
District	225,814	161,596	0.000	0.519
Class Entitlement			**0.0000**	**0.000**
Class 1	64,099	142,679		
Class 2	50,271	49,809	0.000	0.000
Class 3	239,190	179,960	0.000	0.000
Healthcare Facility Ownership			**0.0000**	**0.0000**
Vertical	6,597	39,601		
Provincial Government	16,144	47,264	0.024	0.653
City/District Government	125,764	108,037	0.000	0.142
POLRI	6,165	5,334	0.000	0.000
Ground Force (TNI AD)	9,395	17,463	0.024	0.000
Navy Force (TNI AL)	1,876	4,421	0.100	0.000
Air Force (TNI AU)	793	1,127	0.009	0.000
State-owned Company (BUMN)	5,184	5,826	0.000	0.984
Private	181,642	143,375	0.000	0.538
Participant Segmentation			**0.0000**	**0.4789**
Non Worker (BP)	32,336	56,660		
PBI APBN	124,323	80,244	0.000	0.491

PBI APBD	55,916	53,030	0.005	0.285
PBPU	68,662	84,717	0.021	0.355
PPU	72,323	97,796	0.068	0.586
Healthcare Facility Type			**0.0000**	**0.0000**
Class A Hospital	3,615	39,751		
Class B Hospital	41,199	91,745	0.000	0.001
Class C Hospital	102,484	57,313	0.000	0.000
Class D Hospital	19,767	13,812	0.000	0.000
Private Hospital Equivalent to Type A	0	821		
Private Hospital Equivalent to Type B	11,719	33,860	0.000	0.004
Private Hospital Equivalent to Type C	94,454	74,178	0.000	0.000
Private Hospital Equivalent to Type D	52,770	11,679	0.000	0.000
Military Police Hospital Class I	2,428	4,693	0.003	0.015
Military Police Hospital Class II	3,876	19,542	0.154	0.000
Military Police Hospital Class III	6,937	2,926	0.000	0.307
Military Police Hospital Class IV	4,988	1,184	0.000	
Specialized Surgical Hospital	129	161	0.133	0.296
Specialized Maternal and Child Hospital	904	786	0.001	0.008
Specialized Cardiac Hospital	812	5,105	0.404	0.354
Specialized Psychiatric Hospital	627	3,887	0.464	0.590
Specialized Oncology Hospital	154	643	0.422	0.175
Specialized Eye Hospital	27	2,104	0.077	0.023
Specialized Pulmonary Hospital	616	2,880	0.249	0.078
Specialized Orthopedic Hospital	110	64	0.014	0.024
Other Specialized Hospital	5,946	5,312	0.000	0.000
Non-Provider Emergency Hospital	0	0		
Utilization Frequency			**0.0000**	**0.7753**
Low	210,129	180,672		
High	143,431	191,776	0.000	0.775
Comorbidity			**0.0000**	**0.0000**
Multicomorbidity	33,525	31,576		
Comorbid	265,634	334,113	0.116	0.000
None	54,401	6,759	0.000	0.391
Length of Stay			**0.0000**	**0.0015**
Short	230,129	176,489		
Long	123,431	195,959	0.000	0.002
Severity Level			**0.0000**	**0.0000**
Mild	300,282	152,924		
Moderate	44,405	157,112	0.000	0.000
Severe	8,872	62,412	0.000	0.000

This study (Table 4) finds a significant relationship (p-value < 0.05) between gender, regional type, class entitlement, healthcare facility ownership, healthcare facility type, comorbidities, duration of hospitalization, and severity level with direct hypertension costs during inpatient visits.

The results of this study aligns with Biswas et al. in India, where significant differences (p-value < 0.05) of average inpatient costs are found between genders: 7,725 Rupees for males, which was higher compared to females at 5,904 Rupees in 2016 [34]. This is further supported by Nurmainah and Fudholi, who stated that gender is a predictor of inpatient hypertension events and costs at RSUD Panembahan Senopati Bantul in 2014, where males are at higher risk of inpatient hypertension visits compared to females due to non-adherence to medication (RR = 1.74; CI 95%: 1.01 – 3.02) and are likely to bear higher costs [43]. These findings are consistent with Bambungan et al. at RSUD Sorong in 2017, where gender significantly influenced hypertension treatment costs during inpatient visits (p-value = 0.000) [44].

The significance of regional type in influencing hypertension visit costs can be aligned with findings by Sinaga et al. in 2022, which stated that disparities in dental health resources across regions in Indonesia contribute to inequalities in dental service utilization and healthcare costs. The study found that the availability of dental medical personnel at hospitals was lower in eastern Indonesia regions such as NTT-NTB, Maluku, and Papua compared to western Indonesia regions like Bali, Sumatra, Sulawesi, Java, and Kalimantan [45].

This study found that class entitlement affects the direct costs of hypertension during inpatient visits. According to Yuliastuti et al. (2024), inpatient costs for diabetic patients with hypertension at RSUD Sleman were influenced by class entitlement, where hypertension therapy costs were higher in Class 1 (Rp3,705,129) and Class 2 (Rp2,284,951) compared to Class 3 (Rp1,837,685) [29]. This is reinforced by the cost differences based on INA-CBGS rates for inpatient hypertension patients at RSUD Panembahan Senopati, where the average real cost for Class 3 (Rp2,171,850) was lower compared to Class 2 (Rp2,960,900) and Class 1 (Rp3,800,403) in 2021 [46]. These findings align with Mazidah in 2019, which showed a significant relationship between inpatient class entitlement (p-value = 0.017) and cost of stroke, where 46.36% of the NHI participants suffers with hypertension as a comorbidity at RSUD Blambangan Banyuwangi [47].

Our analysis results show that healthcare facility ownership has a significant relationship with the cost of hypertension for inpatient visits. According to Geyman in 2021, healthcare service costs at investor-owned facilities tend to be higher than those at non-profit facilities in the United States [48]. This is supported by previous research by Woolhandler and Himmelstein in 1997, which found that the highest patient costs were incurred at private for-profit institutions, followed by private non-profit institutions, and the lowest at public institutions [49]. The cost differences between private and public facilities are due to differences in standards and operational procedures directly affecting service delivery costs; investor-owned facilities are known to have poorer service quality compared to non-profit facilities due to shortages of medical personnel, high mortality rates, and a history of patient abuse [48]. According to Esposito et al. in 2022, healthcare service quality significantly influences healthcare costs for Medicare and Medicaid patients (p-value = 0.02), where for-profit hospitals tend to minimize healthcare procurement costs while maximizing revenue from payers or Medicare claims [50]. There is also a possibility of hospital location planning based on community marketing research results [51]. Based on an NHI equity analysis by Johar et al. in 2018 at Indonesia, there is a tendency for pro-poor inpatient services at public hospitals in urban areas but pro-rich services in rural areas due to differences in healthcare needs and resources. This potentially results in lower inpatient service costs in cities but higher costs in rural areas [52].

Based on the table above (Table 4), the type of healthcare facility significantly influences direct costs of hypertension for inpatient visits. According to WHO in 2022, accreditation of health facilities has the potential to widen disparities in healthcare quality between rural and urban areas and directly cause imbalances in health facilities while leading to poverty through high catastrophic healthcare costs [41]. According to Bjorvatn in 2018 as cited in Samuela in 2024, this is due to diversification and specialization of healthcare services often provided by hospitals to meet accreditation requirements as well as patient selection practices by hospitals—especially private facilities [53]. In England, Longo et al. states that inpatient costs at specialty hospitals are higher than those at general hospitals in 2019 [54]. This findings are consistent with comparative studies done by Mleşniţe and Bocşan in 2016 between multi-system public hospitals and single-system hospitals in Romania, where single-system hospitals had higher financial indicators for medication costs compared to multi-system hospitals in 2004: namely 13.09% for multi-pavilion hospitals and 14.43% for single-system hospitals [55].

5. Conclusions

The study finds a significant relationship (p-value < 0.05) between age, regional type, healthcare facility ownership, and type with direct hypertension costs for outpatient visits (RJTL). For inpatient visits (RITL), significant (p-value < 0.05) factors include gender, regional type, class entitlement, facility ownership and type, comorbidities, length of stay, and severity level. This study has temporal limitations as the study covers only claims between January–December 2022, we also analyzes only BPJS-verified claims, excluding indirect costs borne by patients. Potential bias may arise as we only take account of the cost of hypertension from the perspective of BPJS Kesehatan as a third party payer, potentially overestimating costs. The utilization frequency variable lacks specificity between outpatient and inpatient visits. Comorbidities are assessed by counting diagnosis codes, which may overlook relevant conditions. Findings suggest revising the INA-CBGs Tariff system to better align healthcare costs with community needs, reduce disparities, and implement visit-specific cost ceilings. Future researchers should use primary data to explore economic status, healthcare access, education, and HDI, while also incorporating indirect costs. Further research in comorbidities should be assessed by using Charlson's Comorbidity Index (CCI). Additionally, Generalized

Linear Models (e.g., Gamma, Inverse-Gaussian, Log-link) should be employed to enhance cost prediction accuracy, leading to not only the tendency of a high cost visit, but also the price of the visit as well.

References

[1] A. B. Zawudie, T. D. Lemma, and D. W. Daka, "Cost of Hypertension Illness and Associated Factors Among Patients Attending Hospitals in Southwest Shewa Zone, Oromia Regional State, Ethiopia," *ClinicoEconomics Outcomes Res.*, vol. 12, pp. 201–211, 2020. doi: 10.2147/CEOR.S241591.

[2] A. Biswas, R. K. Singh, and S. K. Singh, "Medical and Non-Medical Cost of Hypertension and Heart Diseases in India," *Cogent Soc. Sci.*, vol. 2, no. 1, p. 1250616, 2016.

[3] A. C. Esposito *et al.*, "Do You Get What You Pay For? The Relationship of Price and Quality in Hospital Provided Procedures," *J. Surg. Res.*, vol. 278, pp. 140–148, 2022.

[4] A. D. Laksono and C. Sandra, "Analisis Ekologi Persalinan di Fasilitas Pelayanan Kesehatan di Indonesia," *Bull. Penelit. Sist. Kesehat.*, vol. 23, no. 1, pp. 1–9, 2020.

[5] A. F. Nilansari, N. M. Yasin, and D. A. Puspandari, "Analisis Tarif INA-CBGs Pasien Hipertensi Rawat Inap di Rumah Sakit Umum Daerah Panembahan Senopati," *Indones. J. Clin. Pharm.*, vol. 10, no. 1, pp. 22–29, 2021.

[6] A. M. Iqbal and S. F. Jamal, "Essential Hypertension," *NCBI Bookshelf*, Jul. 20, 2023. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK539859/ [Accessed: Nov. 19, 2024].

[7] A. P. I. Sinaga, "Korelasi Disparitas Ketersediaan Tenaga Medis Gigi Antardaerah terhadap Pemanfaatan Layanan Gigi dan Mulut di Indonesia," *J. Manaj. Pelayanan Kesehat.*, vol. 25, no. 3, pp. 108–115, 2022.

[8] B. Nugroho and A. C. Sjaaf, "The Impact of Accreditation on the Quality of Hospital Service," in *Proc. Int. Conf. Public Health*, vol. 4, no. 2, pp. 279–286, 2019.

[9] BPJS Kesehatan and USAID, *Buku Statistik JKN 2016–2021*. Jakarta: BPJS Kesehatan, 2022.

[10] C. Franco *et al.*, "Essential Hypertension and Oxidative Stress: Novel Future Perspectives," *Int. J. Mol. Sci.*, vol. 23, no. 22, p. 14489, 2022. doi: 10.3390/ijms232214489.

[11] C. Jo, "Cost-of-illness studies: concepts, scopes, and methods," *Clinical and Molecular Hepatology*, vol. 20, no. 4, p. 327, 2014. doi: 10.3350/cmh.2014.20.4.327.

[12] C. N. Kohli-Lynch, A. Erzse, B. L. Rayner, and K. J. Hofman, "Hypertension in The South African Public Healthcare System: A Cost-of-Illness and Burden of Disease Study," *BMJ Open*, vol. 12, no. 2, p. e055621, 2022.

[13] CDC Polaris, "Cost of Illness," Sep. 18, 2024. [Online]. Available: https://www.cdc.gov/polaris/php/economics/cost-illness.html. [Accessed: Dec. 1, 2024].

[14] Centers for Disease Control and Prevention (CDC), "About High Blood Pressure," May 15, 2024. [Online]. Available: https://www.cdc.gov/high-blood-pressure/about/index.html [Accessed: Dec. 1, 2024].

[15] D. G. Harrison, T. M. Coffman, and C. S. Wilcox, "Pathophysiology of Hypertension: The Mosaic Theory and Beyond," *Circulation Research*, vol. 128, no. 7, pp. 847–863, 2021. doi: 10.1161/CIRCRESAHA.121.318082.

[16] D. Williams Jr. and M. Holmes, "Rural health care costs: are they higher and why might they differ from urban health care costs?," *N. C. Med. J.*, vol. 79, no. 1, pp. 51–55, 2018.

[17] E. Adane, A. Atnafu, and A. Y. Aschalew, "The Cost of Illness of Hypertension and Associated Factors at the University of Gondar Comprehensive Specialized Hospital Northwest Ethiopia, 2018," *ClinicoEconomics Outcomes Res.*, vol. 12, pp. 133–140, 2020. doi: 10.2147/CEOR.S234674.

[18] F. A. Sloan, G. A. Picone, D. H. Taylor Jr., and S. Y. Chou, "Hospital Ownership and Cost and Quality of Care: Is There a Dime's Worth Of Difference?," *J. Health Econ.*, vol. 20, no. 1, pp. 1–21, 2001.

[19] F. Baroroh and R. Maghfiroh, "Direct Medical Cost and Length of Stay of Hypertension Patients at Private Hospital in Yogyakarta," *J. Farm. Sains Praktis*, pp. 27–33, 2023.

[20] F. Longo, L. Siciliani, and A. Street, "Are Cost Differences Between Specialist and General Hospitals Compensated by The Prospective Payment System?," *Eur. J. Health Econ.*, vol. 20, pp. 7–26, 2019.

[21] F. Yuliastuti, W. S. Hapsari, N. D. Kartikawati, and R. K. Mahato, "Cost Of Illness in Diabetic Patients with Hypertension in Inpatients at Sleman Regional Hospital," *J. Health Econ. Policy Res. (JHEPR)*, vol. 2, no. 2, 2024.

[22] G. A. Nichols, E. L. Amitay, S. Chatterjee, and D. Steubl, "Health Care Costs Associated with the Development and Combination of Cardio-Renal-Metabolic Diseases," *Kidney360*, vol. 4, no. 10, pp. 1382–1388, 2023. doi: 10.34067/KID.0000000000000212.

[23] H. Maryani, L. Kristiana, A. Paramita, and N. Izza, "Disparitas Pembangunan Kesehatan di Indonesia Berdasarkan Indikator Keluarga Sehat Menggunakan Analisis Cluster," *Bull. Penelit. Sist. Kesehat.*, vol. 23, no. 1, pp. 18–27, 2020.

[24] J. Geyman, "Investor-Owned Health Care: The Hidden Blight on America's 'System'," *Int. J. Health Serv.*, vol. 51, no. 4, pp. 494–500, 2021.

[25] Kementerian Kesehatan RI, "Hipertensi Penyakit Paling Banyak Diidap Masyarakat," May 17, 2019. [Online]. Available: https://sehatnegeriku.kemkes.go.id/baca/umum/20190517/5130282/hipertensi-penyakit-paling-banyak-diidap-masyarakat/ [Accessed: Aug. 28, 2024].
[26] Kementerian Kesehatan RI, "Klasifikasi Hipertensi," 2023. [Online]. Available: https://p2ptm.kemkes.go.id/infographic-p2ptm/hipertensi-penyakit-jantung-dan-pembuluh-darah/page/28/klasifikasi-hipertensi [Accessed: Aug. 28, 2023].
[27] Kementerian Kesehatan RI, *Peraturan Menteri Kesehatan Nomor 28 Tahun 2014 tentang Pedoman Pelaksanaan Jaminan Kesehatan Nasional*. Jakarta: Kementerian Kesehatan RI, 2014.
[28] Kementerian Kesehatan RI, *Peraturan Menteri Kesehatan Nomor 3 Tahun 2023 Tentang Standar Tarif Pelayanan Kesehatan dalam Penyelenggaraan Program Jaminan Kesehatan*. Jakarta: Kementerian Kesehatan RI, 2023.
[29] Kementerian Kesehatan RI, *Peraturan Menteri Kesehatan Nomor 76 Tahun 2016 tentang Pedoman Indonesian Case Base Groups (INA-CBG) dalam Pelaksanaan Jaminan Kesehatan Nasional*. Jakarta: Kementerian Kesehatan RI, 2016.
[30] Kementerian Kesehatan RI, *Profil Kesehatan Indonesia Tahun 2020*. Jakarta: Kementerian Kesehatan RI, 2021.
[31] Kementerian Kesehatan RI, *Profil Kesehatan Indonesia Tahun 2021*. Jakarta: Kementerian Kesehatan RI, 2022.
[32] Kementerian Kesehatan RI, *Profil Kesehatan Indonesia Tahun 2022*. Jakarta: Kementerian Kesehatan RI, 2023.
[33] M. Johar *et al.*, "Inequality in Access to Health Care, Health Insurance and the Role of Supply Factors," *Soc. Sci. Med.*, 2018. doi: 10.1016/j.socscimed.2018.07.044.
[34] M. Mleşniţe and I. S. Bocşan, "Comparison Between a Multi-Pavilion Hospital and a Single Pavilion Hospital," *Clujul Med.*, vol. 89, no. 3, p. 402, 2016.
[35] M. S. Pavel, S. Chakrabarty, and J. Gow, "Cost of Illness for Outpatients Attending Public and Private Hospitals in Bangladesh," *Int. J. Equity Health*, vol. 15, pp. 1–12, 2016.
[36] M. Ying, S. Wang, C. Bai, and Y. Li, "Rural-urban differences in health outcomes, healthcare use, and expenditures among older adults under universal health insurance in China," *PLoS ONE*, vol. 15, no. 10, p. e0240194, 2020. doi: 10.1371/journal.pone.0240194.
[37] N. Nurmainah, A. Fudholi, and I. Dwiprahasto, "Kepatuhan Penggunaan Antihipertensi Sebagai Prediktor Laju Kejadian dan Biaya Rawat Inap," *J. Manaj. Pelayanan Farmasi*, vol. 4, no. 4, pp. 200–206, 2014.
[38] Pemerintah Indonesia, *Undang-Undang Nomor 17 Tahun 2023 Tentang Kesehatan*. Jakarta: Pemerintah Indonesia, 2023.
[39] Pemerintah Indonesia, *Undang-Undang Nomor 24 Tahun 2011 Tentang Badan Penyelenggara Jaminan Sosial*. Jakarta: Pemerintah Indonesia, 2011.
[40] Pemerintah Indonesia, *Undang-Undang Nomor 40 Tahun 2004 Tentang Sistem Jaminan Sosial Nasional*. Jakarta: Pemerintah Indonesia, 2004.
[41] S. Garg, N. Tripathi, A. Ranjan, and K. K. Bebarta, "Comparing the Average Cost of Outpatient Care of Public and For-Profit Private Providers in India," *BMC Health Serv. Res.*, vol. 21, no. 1, p. 838, 2021.
[42] S. Huang, S. Zhang, J. Wang, G. Hou, and S. Xu, "Correlation Between Serum Cystatin C Level and Retinal Blood Flow in Patients with Essential Hypertension," *Ophthalmic Res.*, vol. 65, no. 3, pp. 335–341, 2022. doi: 10.1159/000522219.
[43] S. S. Kar, V. K. Kalidoss, U. Vasudevan, and S. Goenka, "Cost of Care for Hypertension in a Selected Health Center of Urban Puducherry: An Exploratory Cost-of-Illness Study," *Int. J. Noncommun. Dis.*, vol. 3, no. 3, pp. 98–103, 2018.
[44] S. Woolhandler and D. U. Himmelstein, "Costs of Care and Administration at For-Profit and Other Hospitals in The United States," *N. Engl. J. Med.*, vol. 336, no. 11, pp. 769–774, 1997. doi: 10.1056/NEJM199703133361106.
[45] T. Unger, C. Borghi, F. Charchar, N. A. Khan, N. R. Poulter *et al.*, "2020 International Society of Hypertension Global Hypertension Practice Guidelines," *Hypertension*, vol. 75, no. 6, pp. 1334–1357, 2020. doi: 10.1161/HYPERTENSIONAHA.120.15026.
[46] W. C. Stewart, J. A. Stewart, Q. J. Nasser, and M. A. Mychaskiw, "Cost-effectiveness of treating ocular hypertension," *Ophthalmology*, vol. 115, no. 1, pp. 94–98, 2008. doi: 10.1016/j.ophtha.2007.01.040.
[47] World Health Organization, "Hypertension," Mar. 16, 2023. [Online]. Available: https://www.who.int/health-topics/hypertension#tab=tab_1 [Accessed: Aug. 28, 2024].
[48] World Health Organization, *Global Report on Hypertension: the race against a silent killer*. Geneva: World Health Organization, 2023.
[49] World Health Organization, *Health Care Accreditation and Quality of Care: Exploring The Role of Accreditation and External Evaluation of Health Care Facilities and Organizations*, Geneva: WHO, 2022.
[50] World Health Organization, *International Statistical Classification of Diseases and Related Health Problems 10th Revision*. Geneva: World Health Organization, 2019.
[51] X. Chen *et al.*, "Differences in Rural and Urban Health Information Access and Use," *J. Rural Health*, vol. 35, no. 3, pp. 405–417, 2019. doi: 10.1111/jrh.12335.
[52] Y. A. Halasa, W. Zeng, E. Chappy, and D. S. Shepard, "Value and impact of international hospital accreditation: a case study from Jordan," *East. Mediterr. Health J.*, vol. 21, no. 2, pp. 90–99, 2015. doi: 10.26719/2015.21.90.

[53] Y. M. Bambungan, R. A. Oetari, and S. Satibi, "Analisis Biaya Pengobatan Hipertensi pada Pasien Rawat Inap di RSUD Sorong," *2-TRIK: Tunas-Tunas Riset Kesehatan*, vol. 7, no. 2, pp. 72–76, 2017.

[54] Y. Samuela, *Cost of Illness Peserta JKN Penderita Penyakit Jantung Iskemik di Indonesia: Analisis Data Sampel BPJS Kesehatan Tahun 2022*, Undergraduate Thesis, Faculty of Public Health, Universitas Indonesia, Depok, 2024.

[55] Z. Mazidah, N. M. Yasin, and S. A. Kristina, "Analisis Biaya Penyakit Stroke Pasien Jaminan Kesehatan Nasional di RSUD Blambangan Banyuwangi," *J. Manaj. Pelayanan Farmasi*, vol. 9, no. 2, pp. 76–87, 2019.