

# HEALTH SERVICES UTILIZATION OF REFERRAL HOSPITAL IN SIX LARGEST ISLANDS DURING THE COVID-19 PANDEMIC: EVIDENCE FROM INDONESIA

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**Abstract: Background:** COVID-19 pandemic caused changes in hospital utilization. Studies in several countries show decrease in hospital utilization. What about Indonesia, which has thousands of islands? There has been no research that can answer empirically. **Purpose:** This study aims to make comparative analysis of health services utilization before-after pandemic (2019-2020) in Indonesia's 6 largest islands: Sumatra, Java, Kalimantan, Sulawesi, Bali-Nusa Tenggara, Maluku-Papua. **Method:** This study is retrospective study. Data sources are taken from outpatient and inpatient claims for National Health Insurance Program (JKN Program). Comparisons are described by: hospital class (D-C-B-A), age group (ten years multiple), diagnosis and medical procedures. **Result:** Based on island, outpatient's decreases range: 14%-31%, inpatient: 21%-34%. Outpatient's highest decrease is in Maluku-Papua (-31%), and lowest is in Bali-Nusa Tenggara (-14%). Inpatient's highest decrease happens in Sumatra and Sulawesi (-34%), while lowest is in Bali-Nusa Tenggara (-21%). Although Java is an island with largest population and COVID-19 cases, it does not show highest decrease. Each variable's decrease as follows: (a) outpatient: D hospital (-27%); 0-9 years old (-36%); Typhoid (-54%), dental procedures (-44%); (b) inpatient: C hospital (-32%); 10-19 years old (-38%); URTI (-54%), eye surgery (-36%). **Conclusion:** Outpatient's highest decrease occurred in Maluku-Papua, while inpatient occurred in Sumatera and Sulawesi. Decreases occurred for young age group, bacterial infection diseases, also dental and eye procedures. While Bali-Nusa Tenggara were lowest decreases for outpatient and inpatient. **Recommendation:** This study recommends that authorities find out which health services are most needed during pandemic in each island, develop teleconsulting policies to minimizing spread of COVID-19 and effective financing. Further research could be conducted on correlation between decline in utilization and number of COVID-19 in each island.

**Keywords:** COVID-19, health services, utilization, JKN Program

## Introduction

WHO (2020) stated that the COVID-19 pandemic reduced the utilization of health services, which was influenced both by the supply and demand side. The government's policy of limiting population mobility to prevent the spread of the virus reduces the utilization of health services (Ziedan et al. 2020). In addition to government policies, awareness of the spread of COVID-19 prevents people from coming to health facilities, thereby reducing utilization rates (Tsai & Tzu-Ting, 2021). Health facilities have also postponed non-urgent health services to avoid the spread of COVID-19 (Nowlin et al. 2020). The decline in utilization of health services as a result of the COVID-19 pandemic occurred

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in 105 countries. Almost all health services have decreased utilization, essential services, infectious and non-communicable diseases. (WHO, 2020). In America, health services in hospitals have decreased utilization by 20% (Birkmeyer et al. 2020). Meanwhile, in Taiwan, there was a decrease in health service utilization by 11 to 21% (Tsai & Tzu-Ting, 2021).

The COVID-19 outbreak in Indonesia has begun to spread to the outer islands of the archipelago. Indonesia is the largest archipelago in the world. It consists of five major islands and about 30 smaller groups. There is a total number of 17,508 islands of which about 6,000 are inhabited. Straddling the equator, the archipelago is at a crossroads between two oceans, the Pacific and the Indian Oceans, and bridge two continents, Asia and Australia. The largest islands are Sumatra, Jawa (Java), Kalimantan (Indonesian Borneo), Sulawesi, and the Indonesian part of New Guinea (known as Papua or Irian Jaya). Islands are mountainous with dense rain forests, and some have active volcanoes. Most of the smaller islands belong to larger groups, like Maluku or the Moluccas-Spice Islands. The Indonesian government in handling the COVID-19 pandemic, has established a social restriction policy of a certain scale under the conditions of each province (based on Government Regulation of the Republic of Indonesia Number 21 Year 2020 about Large-Scale Social Restrictions in the Context of Accelerating Handling of Corona Virus Disease 2019 [COVID-19]). At the beginning of the pandemic, only hospitals designated as COVID-19 referrals could treat patients with a COVID-19 diagnosis. Along with the increase in COVID-19 cases, all hospitals were asked to contribute in handling COVID-19 patients. In addition, the Indonesian Doctors Association issued guidelines for the protection of doctors' standards in the COVID-19 era, which include setting working hours for doctors (Pengurus Besar Ikatan Dokter Indonesia/Executive Board of the Indonesian Doctors Association, 2020). These policies and conditions certainly affect the utilization of health services in Indonesia, especially for the participants of the JKN-KIS program, which covers 86.59% of the Indonesian population. Therefore, it is necessary to know the description of the utilization of health services for JKN-KIS program participants during the COVID-19 pandemic compared to the period before the pandemic.

## **Materials and Methods**

This study is a retrospective study using secondary data. Data analysis was carried out by comparing data on the utilization of health services in 2020 and data in 2019 as a total sampling. The source of this research data comes from claim data from 2,809 hospitals that collaborate with BPJS Kesehatan in the period 2019 to 2020. Hospital officers provide health service claims data regularly to BPJS Kesehatan branch offices per month. The health service claim data from the hospital is then documented in a system called Verification Claim (VClaim) which is owned by BPJS Kesehatan. Next, the researcher collected data from the data warehouse at BPJS Kesehatan and then compared it with the data in the hospital claims software to validate the amount of data each year during 2016 to 2019 and the characteristics of its utilization.

The amount of data analyzed is 187,418,576 outpatient and inpatient visits, consisting of 2019 data of 106,419,101 outpatient and inpatient visits, and 2020 data of 80,999,475 outpatient and inpatient visits. The data are grouped per level of outpatient and inpatient services in the six largest islands: Sumatera, Jawa (Java), Kalimantan, Sulawesi, Bali & Nusa Tenggara, Maluku & Papua including provinces in each islands. Comparisons are described by: the hospital class of referral hierarchy (from class D-the lowest to class A-the highest: D, C, B, A), age group (ten years multiple), diagnosis and

medical procedures. The diagnosis uses the ICD 10 code and the action procedure uses the INA CBG code derived from INACBG's e-claim application.

Researchers also conducted an observational health record review between January 1 and April 22, 2020, comparing the characteristics of all health service visits in the emergency room to obtain a comparison of health service data in the period before and after the COVID-19 pandemic. Measures performed by the researchers included triage acuity, presenting complaints, final diagnoses, disposition, and mortality. Researchers also examined three time-sensitive final diagnoses: stroke; sepsis; and acute coronary syndrome (ACS).

**Results**

Overall there were 71,468,204 and 93,757,915 outpatient visits, as well as 12,657,148 and 9,527,231 inpatient in 2020 and 2019. In 2020 there was a decrease in the utilization of health services in hospitals, namely outpatient services by (-24%) and inpatient services by (-25%) compared to data in 2019 (Table 1). Meanwhile, services in the emergency department that are part of the outpatient department decreased by (-33%) (Table 2).

*Table 1. Outpatient and Inpatient Utilization*

Level of Service	Year		
	2019	2020	Difference %
<b>Outpatient</b>	93,757,915	71,468,204	-24%
<b>Inpatient</b>	12,657,148	9,527,231	-25%

*Table 2. Utilization of Emergency Unit Service*

Service	Year		
	2019	2020	Difference %
<b>Emergency</b>	6,527,591	4,373,530	-33%
<b>Non-Emergency</b>	87,230,324	67,094,674	-23%

Outpatient and inpatient utilization showed a decline starting in April 2020, along with an increase in COVID-19 cases in Indonesia. The highest decline occurred in May 2020. The average monthly outpatient utilization was 8.4 million, down to 6.4 million during the pandemic. Meanwhile, the average monthly inpatient utilization is 1.2 million, down to 830 thousand during the pandemic (Figure 1).

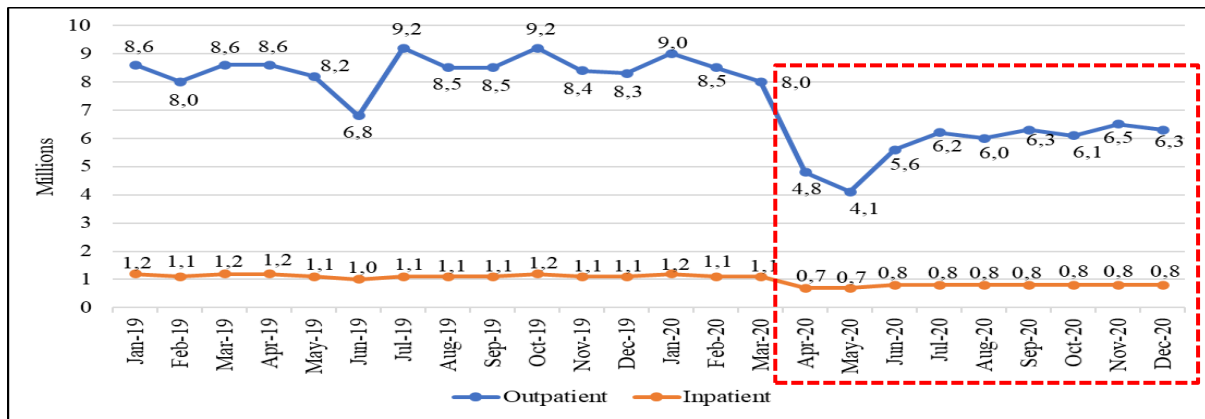


Figure 1. Trend of Decreasing Outpatient and Inpatient During the COVID-19 Pandemic

### Utilization of Health Services by Island

The utilization of health services has decreased in all islands, both outpatient and inpatient services. The highest decrease in outpatient utilization occurred on the island of Sulawesi (-30%) and the lowest on the island of Bali-Nusa Tenggara (-14%). While the decrease in inpatient utilization, the highest decline in utilization occurred on the islands of Sumatra and Sulawesi (-34%), the lowest on the island of Bali-Nusa Tenggara (-21%). Although the provinces on the island of Java did not show the highest percentage decline in utilization, the outpatient and inpatient utilization rates fell by 16,128,064 outpatient and inpatient visits, or 63% of the total decrease in the utilization of health services in hospitals throughout Indonesia (Table 3).

Table 3. Outpatient and Inpatient Utilization by Island

Island	Number of Visits					
	Outpatient			Inpatient		
	2019	2020	Difference %	2019	2020	Difference %
<b>Sumatera</b>	16.746.924	12.644.926	-24%	2.713.937	2.000.037	-34%
<b>Jawa</b>	61.503.745	47.042.483	-24%	7.189.121	5.522.319	-22%
<b>Bali &amp; Nusa Tenggara</b>	4.326.641	3.716.008	-14%	571.034	485.555	-21%
<b>Kalimantan</b>	4.697.359	3.508.958	-25%	742.516	550.248	-26%
<b>Sulawesi</b>	5.642.369	3.974.946	-30%	1.216.211	807.979	-34%
<b>Maluku &amp; Papua</b>	840.877	580.883	-31%	224.329	161.093	-28%

When observed based on provinces in each island, in percentage terms, the provinces that experienced the highest decrease in outpatient utilization was Jambi (-37%), while the lowest were Lampung (-11%) and Bali-East Nusa Tenggara (-12%). In inpatient services, the highest decrease in utilization occurred in the province of Gorontalo (-39%) and the lowest in the province of Bali (-11%) as shown in table 4 below.

Table 4. Outpatient and Inpatient Utilization by Province

Island	Province	Number of Visits					
		Outpatient			Inpatient		
		2019	2020	Difference %	2019	2020	Difference %
Sumatera	Jambi	659.519	418.621	-37%	130.981	87.808	-32%
	South Sumatra	1.829.978	1.237.487	-32%	322.959	220.364	-32%
	West Sumatra	3.024.961	2.119.846	-30%	261.159	178.874	-31%
	North Sumatra	3.798.852	2.838.108	-25%	654.529	451.171	-27%
	Nanggroe Aceh Darussalam	2.422.128	1.815.644	-25%	505.141	370.019	-29%
	Bengkulu	428.472	334.482	-22%	98.438	70.020	-16%
	Bangka Belitung Islands	433.962	353.170	-19%	63.421	53.432	-17%
	Riau	1.926.865	1.587.529	-18%	235.555	194.469	-17%
	Riau Islands	832.109	705.783	-15%	103.634	85.940	-15%
	Lampung	1.390.078	1.234.256	-11%	338.120	287.940	-26%
Jawa	DKI Jakarta	9.397.449	6.660.845	-29%	846.811	558.291	-25%
	East Java	14.619.736	10.634.275	-27%	1.725.324	1.294.444	-19%
	Banten	4.229.403	3.345.198	-21%	522.223	424.088	-20%
	West Java	15.886.997	12.570.086	-21%	1.984.630	1.590.400	-21%
	Central Java	14.876.452	11.809.096	-21%	1.875.866	1.477.310	-24%
	DI Yogyakarta	2.493.708	2.022.983	-19%	234.267	177.786	-23%
Bali&Nusa Tenggara	West Nusa Tenggara	998.424	781.519	-22%	148.068	115.747	-14%
	Bali	2.581.561	2.273.861	-12%	253.181	218.863	-11%
	East Nusa Tenggara	746.656	660.628	-12%	169.785	150.945	-15%
Kalimantan	North Kalimantan	246.414	168.771	-32%	45.399	35.757	-28%
	Central Kalimantan	390.145	279.031	-28%	82.681	59.401	-29%
	South Kalimantan	1.256.697	922.724	-27%	191.978	137.046	-26%
	East Kalimantan	2.035.932	1.498.792	-26%	274.142	202.164	-22%
	West Kalimantan	768.171	639.640	-17%	148.316	115.880	-26%
Sulawesi	Gorontalo	216.307	143.425	-34%	89.481	54.354	-39%
	North Sulawesi	1.258.736	840.360	-33%	213.977	132.728	-38%

Island	Province	Number of Visits					
		Outpatient			Inpatient		
		2019	2020	Difference %	2019	2020	Difference %
	West Sulawesi	202.204	136.151	-33%	46.558	32.094	-31%
	South Sulawesi	2.980.788	2.062.840	-31%	595.751	385.247	-35%
	Southeast Sulawesi	382.068	275.539	-28%	91.967	69.490	-24%
	Central Sulawesi	602.266	516.631	-14%	178.477	134.066	-25%
	West Papua	139.126	93.259	-33%	46.006	31.161	-32%
Maluku & Papua	Papua	410.823	276.152	-33%	86.140	66.101	-23%
	North Maluku	107.888	72.561	-33%	45.315	32.051	-29%
	Maluku	183.040	138.911	-24%	46.868	31.780	-32%

### Utilization by Hospital Class

Based on the class of health facility, advanced referral health services are carried out in class A, B, C, and D hospitals and primary clinics. Hospitals as advanced referral health facilities that collaborated with BPJS Kesehatan in the 2019-2018 period were 2,803. There are 56 class A hospitals, 379 class B hospitals, 1,311 class C hospitals, 751 class D hospitals, and 312 primary clinics. The decrease in utilization occurred in all hospitals and primary clinics and occurred in outpatient and inpatient services. In outpatient services, the highest decline occurred in class D hospitals (-27%) and the lowest decline occurred in primary clinics (-19%). In inpatient services, the highest decline occurred in class C hospitals (-32%) and the lowest decline occurred in class A hospitals (-5%) (Table 5).

Table 5. Outpatient and Inpatient Utilization by Hospital Class

Class of FKRTL	Number of FKRTL	Number of Visits					
		Outpatient			Inpatient		
		2019	2020	Difference %	2019	2020	Difference %
RS A	56	6.434.234	4.819.976	-25%	62.682	59.600	-5%
RS B	379	25.916.663	19.352.224	-25%	803.826	563.890	-30%
RS C	1311	49.390.298	38.318.901	-22%	3.610.677	2.462.691	-32%
RS D	751	9.906.712	7.260.896	-27%	6.466.445	5.081.625	-21%
Primary Clinic	312	2.110.008	1.716.207	-19%	1.713.518	1.359.425	-21%

### Hospital Service Utilization by Age Group

Hospital service utilization by age group, divided into 5 categories, namely: 0-9 years old, 10-19 years old, 20-39 years old, 40-60 years old, and > 60 years old. All age groups experienced a decrease in the utilization of health services, both outpatient and inpatient in hospitals. In outpatient services, the highest decline occurred in the age group of 0-9 years old (-38%) and the lowest was in the age group

of 20-60 years old (-20%). In inpatient services, the highest decline occurred in the 10-19 years old age group (-36%) and the lowest in the 20-39 years old age group (-18%) (Table 6).

Table 6. Outpatient and Inpatient Utilization by Age Group

Age Group	Number of Visits					
	Outpatient			Inpatient		
	2019	2020	Difference %	2019	2020	Difference %
0-9 years old	4.192.202	2.608.236	-38%	1.692.684	1.370.957	-19%
10-19 years old	4.924.418	3.322.269	-33%	978.618	625.548	-36%
20-39 years old	17.190.742	13.718.202	-20%	3.790.271	3.118.667	-18%
40-60 years old	37.383.402	29.884.836	-20%	3.414.178	2.578.965	-24%
> 60 years old	27.165.418	20.269.439	-25%	2.255.147	1.550.470	-31%

### Hospital Service Utilization by Diagnosis

In the category of outpatient service, the highest decrease occurred in utilization with a diagnosis of typhoid fever (-54%) while chronic kidney disease experienced an increase in visits by 1%. In the category of inpatient services, the highest decrease occurred in utilization with a diagnosis of upper respiratory tract infection (-54%) and the lowest decrease occurred in utilization with a diagnosis of Chronic Kidney Disease (-13%) (Table 7).

Table 7. Outpatient and Inpatient Utilization by Diagnosis

Diagnosis	Hospital Visit Decrease	
	Outpatient	Inpatient
Upper Respiratory Tract Infection	-48%	-54%
Typhoid Fever	-54%	-53%
COPD	-42%	-49%
Gastroenteritis	-45%	-47%
Bronchitis	-53%	-47%
Cataract	-36%	-43%
Dental Diseases	-47%	-43%
Dengue Fever	-49%	-40%
Dyspepsia	-27%	-37%
Hypertension	-38%	-35%
Pulmonary Tuberculosis	-41%	-32%
Heart Failure	-39%	-32%
Pneumonia	-25%	-28%
Hepatitis	-39%	-23%
Diabetes Mellitus	-35%	-20%
Anemia	-24%	-16%

Diagnosis	Hospital Visit Decrease	
	Outpatient	Inpatient
Cancer	-3%	-16%
Chronic Kidney Disease	1%	-13%

### *Hospital Service Utilization by Procedures/Interventions*

Utilization of outpatient services in hospitals based on medical procedures/interventions is calculated based on 5 procedures, namely: dental procedures, medical rehabilitation (physiotherapy), eye surgeries (cataract and others), chemotherapy, and hemodialysis. The highest decrease occurred in outpatient services with dental procedures (-44%) and the lowest decrease occurred in health services with chemotherapy procedures (-0.2%) (Table 8).

Table 8. Utilization of Outpatient Procedures/Interventions

Procedures/Interventions	2019	2020	Difference (%)
Dental Procedures	2.092.111	1.163.329	-44%
Medical Rehabilitation (Physiotherapy)	8.775.247	5.527.034	-37%
Eye Surgeries (Cataract and Others)	2.775.038	1.755.720	-37%
Chemotherapy	294.757	294.023	-0.2%
Hemodialysis	5.601.472	6.029.150	8%

Meanwhile, although outpatient services have decreased based on several medical procedures/interventions, it turns out that health services with hemodialysis procedures actually increased by 8% compared to the data in 2019. One of the causes of the increase in hemodialysis is the increase in the number of outpatient visits with a diagnosis of chronic kidney disease by 1%.

Furthermore, apart from outpatient services, a decrease in the utilization of health services also occurred in inpatient services at hospitals. The largest decrease in utilization of inpatient services in hospitals occurred in eye surgeries procedures (cataract and others) by (-36%) and the smallest decrease occurred in normal delivery procedures (-10%). Although inpatient services at hospitals based on several medical procedures/interventions have decreased, however, caesarean section procedures have actually increased by 2% in 2020 compared to the data in 2019 (Table 9).

Table 9. Utilization of Inpatient Procedures/Interventions

Procedures/Interventions	2019	2020	Difference (%)
Eye Surgeries (Cataract and Others)	90.764	58.141	-36%
Chemotherapy	182.348	152.193	-17%
Normal Delivery	708.551	638.472	-10%
Cesarean Section	945.717	963.841	2%



**Utilization Based on Diagnosis and Hospital Class**

Diagnosis of typhoid fever experienced the highest decrease in outpatient utilization in class A, B, and C hospitals (-73%, -59%, -53%). Meanwhile, utilization with a diagnosis of bronchitis experienced the highest decline in class D hospitals (-59%) and primary clinics (-60%). Utilization of health services with a diagnosis of upper respiratory tract infection decreased by > 50% in all major hospital and clinic classes, except for class B hospitals. In class A hospitals, the diagnoses of diseases that experienced a decrease in outpatient utilization of more than 50% were dengue fever, gastroenteritis, hypertension, and dental disease. Meanwhile, in class B and D hospitals, the diagnosis of a disease that has decreased utilization by more than 50% is dengue fever. Increased utilization occurred in chronic kidney disease diagnoses in all hospitals and primary clinics except for class A and B hospitals. In addition, cancer diagnoses increased in all hospital classes except for class A hospitals (Table 10).

Table 10. Outpatient Utilization by Diagnosis and Hospital Class

Outpatient Diagnosis	Hospital Class				
	A	B	C	D	Primary Clinic
<b>Typhoid Fever</b>	-73%	-59%	-53%	-55%	-41%
<b>Upper Respiratory Tract Infection</b>	-59%	-37%	-51%	-55%	-51%
<b>Dengue Fever</b>	-66%	-54%	-46%	-51%	-39%
<b>Gastroenteritis</b>	-59%	-49%	-42%	-46%	-27%
<b>Hypertension</b>	-43%	-43%	-36%	-41%	-39%
<b>Dyspepsia</b>	-47%	-29%	-25%	-33%	-4%
<b>Dental Diseases</b>	-54%	-47%	-47%	-47%	-57%
<b>COPD</b>	-46%	-44%	-39%	-49%	-40%
<b>Pulmonary Tuberculosis</b>	-27%	-40%	-39%	-51%	-35%
<b>Pneumonia</b>	-17%	-9%	-26%	-37%	-46%
<b>Heart Failure</b>	-42%	-40%	-38%	-41%	-36%
<b>Diabetes Mellitus</b>	-30%	-37%	-34%	-37%	-23%
<b>Bronchitis</b>	-35%	-44%	-52%	-59%	-60%
<b>Cataract</b>	-36%	-49%	-35%	-35%	-26%
<b>Hepatitis</b>	-34%	-42%	-38%	-42%	-27%
<b>Chronic Kidney Disease</b>	-10%	-2%	4%	19%	2%
<b>Cancer</b>	-13%	13%	14%	13%	19%
<b>Anemia</b>	-19%	-14%	-32%	-28%	-37%

Same with outpatient, the diagnosis of typhoid fever experienced the highest decrease in inpatient utilization in class A, B, and C hospitals (-68%, -63%, -53%). The utilization of health services with a diagnosis of upper respiratory tract infection fell by more than 50% in all hospital classes, except for

the primary clinic. Meanwhile, utilization with a diagnosis of bronchitis experienced the highest decline in class B hospitals (-51%). The increase in utilization occurred in the diagnosis of chronic kidney disease in all hospitals and primary clinics except for class A hospitals. The increase in utilization for cancer diagnoses occurred in class C hospitals (Table 11).

*Table 11. Inpatient Utilization by Diagnosis and Hospital Class*

<b>Outpatient Diagnosis</b>	<b>Hospital Class</b>				
	A	B	C	D	Primary Clinic
<b>Typhoid Fever</b>	-68%	-63%	-53%	-47%	-20%
<b>Upper Respiratory Tract Infection</b>	-64%	-55%	-54%	-54%	-35%
<b>Dengue Fever</b>	-55%	-48%	-36%	-36%	-5%
<b>Gastroenteritis</b>	-55%	-51%	-46%	-42%	-21%
<b>Hypertension</b>	-54%	-46%	-35%	-28%	4%
<b>Dyspepsia</b>	-53%	-44%	-36%	-29%	-18%
<b>Dental Diseases</b>	-51%	-43%	-43%	-30%	-25%
<b>COPD</b>	-46%	-52%	-48%	-49%	-34%
<b>Pulmonary Tuberculosis</b>	-42%	-34%	-30%	-32%	-30%
<b>Pneumonia</b>	-41%	-32%	-26%	-20%	-17%
<b>Heart Failure</b>	-40%	-38%	-30%	-27%	19%
<b>Diabetes Mellitus</b>	-36%	-31%	-15%	-12%	10%
<b>Bronchitis</b>	-34%	-51%	-47%	-42%	-19%
<b>Cataract</b>	-30%	-53%	-43%	-38%	-14%
<b>Hepatitis</b>	-30%	-34%	-20%	-13%	-13%
<b>Chronic Kidney Disease</b>	-25%	-15%	-11%	-10%	28%
<b>Cancer</b>	-19%	-11%	-21%	2%	-25%
<b>Anemia</b>	-11%	-24%	-12%	-4%	-2%

In class A hospitals, the diagnoses of diseases that have decreased inpatient utilization by more than 50% are dengue fever, gastroenteritis, hypertension, dyspepsia and dental disease. Meanwhile in class B hospitals, the diagnoses of diseases that have decreased utilization by more than 50% are typhoid fever, gastroenteritis, chronic obstructive pulmonary disease, bronchitis and cataracts. Increased utilization in the primary clinic occurred in services diagnosed with hypertension (4%), diabetes mellitus (10%) and chronic kidney disease (28%).

#### ***Utilization by Diagnosis and Age Group***

In the age group 0-9 years old, at the outpatient service level, the highest decrease in utilization was diagnosed with typhoid fever respiratory infection (-66%). In the 10-19 years old of age group, the highest decrease occurred in utilization with a diagnosis of typhoid fever (-63%), while cancer and chronic kidney disease increased by 1% and 12%, respectively. In the age group 20-39 years old, at the outpatient service level, the highest decrease occurred in utilization with a diagnosis of typhoid

fever (-49%), and the increase in utilization occurred in a diagnosis of chronic kidney disease by 1%. In the 40-60 year age group, at the outpatient service level, the highest decrease occurred in utilization with dental disease (-49%), and the increase in utilization occurred in chronic kidney disease diagnosis by 3%. In the age group > 60 years old, at the level of outpatient services, the highest decrease occurred in utilization with a diagnosis of Bronchitis (-54%) (Table 12).

Table 12. Outpatient Utilization by Diagnosis and Age

Outpatient Diagnosis	Age Group				
	0-9 years	10-19 years	20-39 years	40-60 years	>60 years
<b>Typhoid Fever</b>	-66%	-63%	-49%	-37%	-40%
<b>Dengue Fever</b>	-61%	-55%	-44%	-25%	-20%
<b>Bronchitis</b>	-61%	-54%	-33%	-45%	-54%
<b>Upper Respiratory Tract Infection</b>	-60%	-55%	-24%	-33%	-43%
<b>Pneumonia</b>	-55%	-40%	9%	8%	-23%
<b>Pulmonary Tuberculosis</b>	-53%	-44%	-37%	-37%	-42%
<b>Gastroenteritis</b>	-50%	-53%	-39%	-42%	-40%
<b>Hepatitis</b>	-47%	-41%	-39%	-37%	-41%
<b>Cataract</b>	-47%	-48%	-29%	-29%	-39%
<b>Hypertension</b>	-45%	-40%	-28%	-36%	-42%
<b>Dental Diseases</b>	-44%	-46%	-47%	-49%	-49%
<b>Anemia</b>	-17%	-21%	-20%	-23%	-33%
<b>Cancer</b>	0%	1%	-1%	-2%	-9%
<b>Dyspepsia</b>			-22%	-23%	-31%
<b>Heart Failure</b>			-35%	-36%	-42%
<b>COPD</b>			-26%	-38%	-45%
<b>Chronic Kidney Disease</b>			1%	3%	-2%
<b>Diabetes Mellitus</b>			-28%	-33%	-38%

Diagnosis of typhoid fever, dengue fever, and gastroenteritis decreased outpatient utilization > 50% in the age group < 19 years old. In the 0-9 years old of age group, at the outpatient service level there was a decrease of > 50% in utilization with a diagnosis of respiratory tract infection (bronchitis, upper respiratory tract infection, pneumonia and pulmonary tuberculosis). Bronchitis diagnosis experienced a decrease in outpatient utilization > 50% in the age group < 19 years old ≥ 60 years old. Diagnoses of diabetes mellitus, hypertension and heart failure decreased utilization by (-38%), (-42%) and (-42%). Increased utilization with a diagnosis of pneumonia occurred in the age group of 20-39 years old (9%) and 40-60 years old (8%). The increase in chronic kidney disease cases occurred in the group in the age group > 20 years old ≤ 60 years old by 1%-3%. The increase in cases also occurred in cancer diagnoses by 1% in the 10-19 years old age group.

Table 13. Inpatient Utilization by Diagnosis and Age

Outpatient Diagnosis	Age Group				
	0-9 years	10-19 years	20-39 years	40-60 years	>60 years
<b>Typhoid Fever</b>	-58%	-58%	-51%	-43%	-47%
<b>Upper Respiratory Tract Infection</b>	-56%	-58%	-49%	-38%	-45%
<b>Bronchitis</b>	-52%	-45%	-29%	-28%	-40%
<b>Gastroenteritis</b>	-49%	-50%	-44%	-44%	-44%
<b>Pulmonary Tuberculosis</b>	-43%	-32%	-28%	-29%	-39%
<b>Dengue Fever</b>	-41%	-45%	-39%	-29%	-31%
<b>Pneumonia</b>	-38%	-35%	-10%	-7%	-29%
<b>Dental Diseases</b>	-33%	-36%	-43%	-47%	-43%
<b>Heart Failure</b>	-31%	-26%	-25%	-28%	-37%
<b>Anemia</b>	-4%	-14%	-20%	-13%	-21%
<b>Cancer</b>	4%	-7%	-15%	-18%	-23%
<b>COPD</b>		-33%	-35%	-45%	-51%
<b>Dyspepsia</b>		-47%	-34%	-31%	-40%
<b>Cataract</b>		-39%	-35%	-37%	-47%
<b>Hypertension</b>			-30%	-34%	-39%
<b>Hepatitis</b>			-18%	-24%	-27%
<b>Diabetes Mellitus</b>			-14%	-18%	-24%
<b>Chronic Kidney Disease</b>		-4%	-8%	-12%	-18%

In the 0-9 years old of age group, the highest reduction in inpatient services occurred in utilization with a diagnosis of typhoid fever (-58%). In the 10-19 years old of age group, the highest decrease occurred in utilization with a diagnosis of typhoid fever infection (-58%), and upper respiratory tract (-58%). In the age group 20-39 years old, the highest decrease occurred in utilization with a diagnosis of typhoid fever (-51%). In the 40-60 years old of age group, the highest decrease occurred in utilization with a diagnosis of dental disease (-47%). In the age group > 60 years old, the highest decrease occurred in utilization with a diagnosis of chronic obstructive pulmonary disease (-51%), and a diagnosis of typhoid fever experienced the highest decrease in hospitalization utilization in the age group < 40 years old. In the 0-9 years old of age group, at the inpatient service level, there was a decrease of > 50% in utilization with a diagnosis of respiratory tract infection (bronchitis, upper respiratory tract infection, pneumonia, and pulmonary tuberculosis). Diagnoses of diabetes mellitus, hypertension and heart failure decreased utilization by 31%, 59% and 63% in the age group > 60 years old (Table 13).

## Discussion

A total of 105 countries experienced a decline in the utilization of health services. This occurs due to disturbances on the supply and demand sides. The decline occurred at all levels of service, except for the emergency department (WHO, 2020). A summary of studies conducted in 20 countries showed a decrease in health service utilization by (-33%) (Moynihan et al. 2021). In line with the study in 20 countries, BPJS Kesehatan data shows that there is a decrease in the utilization of health services for

BPJS Kesehatan participants in hospitals by (-24%) in outpatient services, by (-33%) in emergency services and by (-25%) for inpatient services when compared to 2019. (BPJS Kesehatan, 2021). The results of this study strengthen the findings of previous research. In America, there has been a decrease in utilization ranging from (-20%) to (-40%), in outpatient and inpatient services (Birkmeyer et al. 2020, Ziedan et al. 2020). Meanwhile, Taiwan reported a decrease in utilization of -21 percent for outpatient services and 11% for inpatient services (Tsai & Tzu-Ting, 2021). A study conducted at the Hospital Emergency Unit in Japan showed a decrease in the utilization rate of health services by (-40.6%) (Yamamoto et al. 2021).

All provinces in six islands of Indonesia showed a decrease in the utilization of health services in hospitals. Outpatient services decreased between (-37%) to (-11%) and inpatient services around (-39%) up to (-11%). This condition may occur as a result of the implementation of restrictions on community activities (PPKM) in accordance with different PPKM policies in each province. State closure policies in America to limit population mobility also reduce outpatient visits by about (-15%) to (-16%) (Ziedan et al. 2020). The island of Java, with a population of 56.1% of the entire population of Indonesia, experienced a decrease in outpatient and inpatient utilization by 16,128,064 or 63% of the total decrease in the utilization of health services in hospitals throughout Indonesia. The Indonesian government implements a policy of strict restrictions for the Java region. This policy may cause a decrease in hospital utilization in Java. Based on study by Xiao et al. (2021) who conducted a retrospective observational cohort study of health services utilization from health facilities at all levels in all provinces of mainland China (time-series analyses for 2016–2020), found the reductions in both health facility visits and inpatient volume were greater in hospitals than in primary health care facilities ( $p < 0,0001$ ) and greater in developed regions than in underdeveloped regions ( $p < 0,0001$ ).

In addition to health policy, the availability and capacity of health facilities, affect the utilization of health services (Andersen & Newman. 2005). During the COVID-19 pandemic, all government hospitals are required to serve COVID-19 patients and all private hospitals are asked to contribute in handling COVID-19 patients. This policy is thought to have caused the capacity of hospitals to serve BPJS Kesehatan participants to decline, thereby reducing the utilization of health services. The data shows a decrease in utilization in 2,803 hospitals that cooperate with BPJS Kesehatan in all hospital classes (A, B, C, D) and primary clinics. Research in Taiwan (Tsai & Tzu-Ting, 2021), found that without restrictions on mobility and lack of hospital capacity, a decrease in utilization will still occur because people avoid coming to the hospital so that transmission does not occur. The condition of people who avoid coming to the hospital is in accordance with research conducted by Lee & You (2021) which states that among the participants, 73.2% avoided healthcare utilization, and there was no significant difference in the prevalence of healthcare avoidance between groups with (72.0%) and without (74.9%) an underlying disease. Furthermore, to ascertain the factors that led to a decrease in hospital utilization during the COVID-19 pandemic, further research is needed.

Decreased utilization occurred in the diagnosis of infectious diseases (typhoid fever, dengue fever, hepatitis) including respiratory tract infections (upper respiratory tract infections, chronic obstructive pulmonary disease, bronchitis, pulmonary tuberculosis, pneumonia) and non-communicable diseases (cataracts, dental disease, gastroenteritis, dyspepsia, diabetes mellitus, heart disease, anemia, cancer, chronic renal failure). Previous study by Hangartner et al. (2022) which investigated the displacement and underuse of non-COVID-19 patient care in a medical department of a tertiary hospital in

Switzerland. In this retrospective cross-sectional study, internal medicine admissions from 2017 to 2020, emergency outpatient visits from 2019 to 2020 and COVID-19 admissions in 2020 were analyzed and compared using a regression model. Internal medicine admissions were also stratified by diagnosis. There were significantly fewer admissions for patients with ICD code I (diseases of the circulatory system) as a proportion of total admissions in 2020 compared to pre-pandemic years: 1,625 (31%) versus 5,415 (34%),  $p < 0.001$ ; while the proportion of ICD-Code J (respiratory system) admissions to total admissions was significantly higher in 2020 than in pre-pandemic years: i.e. 545 (10%) versus 405 (7%),  $p < 0.001$ ; but there was no significant difference in weekly admissions for the ICD-Code C (malignant neoplasm) in 2020 compared to the pre-pandemic years.

All age groups experienced a decrease in the utilization of health services, the highest was in the 10-19 year age group. During the pandemic there is a government policy to study from home or study online to keep students safe from the spread of COVID-19 in Indonesia. Reporting from the Centers for Disease Control and Prevention (CDC) on February 2022 about Pediatric Emergency Department Visits Before and During the COVID-19 Pandemic in the United States in the period January 2019 to January 2022, the highest decline in health service utilization was found among adolescents aged 12-17 years. During the period January 2020 to January 2022, it was also found that the number and proportion of visits for injuries from physical activities (e.g., walking, swimming, and running) decreased compared with the number of visits in 2019, with a decrease of 1,669 visits per week during 2020 (VR = 0.80), 966 visits per week during 2021 (VR = 0.80), and 757 visits per week during January 2022 (VR = 0.72) (Radhakrishnan et al. 2022).

All major classes of hospitals and clinics experienced a decrease in the utilization of both outpatient and inpatient services. The cause of this decrease in utilization may be due to many factors. The lowest decrease in utilization occurred in hospitalization in class A hospitals (-5%). Utilization based on diagnosis, in inpatient services in class A hospitals, diagnoses of cancer, chronic kidney disease, heart failure, and diabetes mellitus have decreased but not more than 50% compared to before the pandemic. This condition is possible because the number of beds in class A hospitals is more than in other hospital classes. Most of the Class A hospitals are hospitals belonging to the Ministry of Health which are the focus of health services during the COVID-19 pandemic for Covid and Non-Covid patients. In addition, there is a tiered referral system policy that makes class A hospitals the highest referral hospitals to handle severe cases that cannot be served in class B, C, and D hospitals and primary clinics. The low decline in inpatient cases at class A hospitals indicates that cases with severe conditions referred to class A hospitals are relatively unaffected by the Covid pandemic due to the need for patient care. This result supported study by Kalanj et al. (2021) about The Impact of COVID-19 on Hospital Admissions in Croatia which found in 2020, the total number of admissions compared to average admission for the previous 3 years decreased by 21% (an average of 532,860 cases between 2017 and 2019 to 420,890 cases in 2020). The decline in the number of admissions was similar in both tertiary and secondary level hospitals.

The diagnosis of typhoid fever experienced the highest decrease in outpatient and inpatient utilization in class A, B, and C hospitals and the age group < 40 years old. In class A hospitals, the diagnoses of diseases that experienced a decrease in outpatient utilization of more than 100% were dengue fever, gastroenteritis, hypertension, and dental disease. Meanwhile, in class B and D hospitals, the diagnosis of a disease that has decreased utilization by more than 50% is dengue fever. Diagnosis of typhoid fever, dengue fever, gastroenteritis, hypertension, and dental disease is the competence of doctors at

first-level health facilities to handle the diagnosis of these diseases completely without having to be referred to a hospital. Further research can be conducted to determine the referral pattern from first-level health facilities to hospitals during the COVID-19 pandemic. So that they can formulate more effective policies for post-pandemic services.

Utilization with a diagnosis of bronchitis experienced the highest decline in class D hospitals and primary clinics. Utilization of health services with a diagnosis of upper respiratory tract infection decreased by > 50% in class A, C, and D hospitals, primary clinics and in the age group < 19 years old. In the age group 0-9 years old, at the level of outpatient and inpatient services, there was a decrease of > 50% in utilization with a diagnosis of respiratory tract infection (bronchitis, upper respiratory tract infection, pneumonia and pulmonary tuberculosis). Bronchitis diagnosis experienced a decrease in outpatient utilization by > 50% in the age group < 19 years old and > 60 years old. The results of this study are in line with the findings of Blecker et al. (2020) in four hospitals in America, there was a decrease in the utilization of respiratory disease diagnoses. The decrease in service utilization with a diagnosis of respiratory tract infection in BPJS Kesehatan participants may occur because the disease due to the COVID-19 pandemic is funded by the state and is not billed to BPJS Kesehatan. So it is not certain whether there has been a decrease in service utilization with a diagnosis of respiratory tract infection during the COVID-19 pandemic.

Research conducted in America found that people with diabetes mellitus aged 30-59 years old and > 60 years old had difficulty accessing health facilities during the COVID-19 pandemic by 63% and 26%, respectively. Difficult access for people with diabetes mellitus can worsen the health status of patients because they do not get the health services they should (Czeisler et al. 2021). In line with these findings, in this study, the highest decrease in utilization of diabetes mellitus diagnosis occurred in the age group of 20-60 years old and > 60 years old. Anticipating this condition, BPJS Kesehatan implements a chronic disease drug iteration policy, participants do not need to come to the hospital to get medicine. Monitoring of the patient's health status is carried out through teleconsultation between the patient and the doctor. However, further research is needed to measure the effectiveness of implementing these policies on the quality of life of chronic disease sufferers during the pandemic. Considering the utilization of chronic kidney disease diagnosis and hemodialysis measures have increased. Research conducted in Germany using claim data from 86 Helios hospitals found a decrease in the utilization of heart disease. Cancer diagnoses decreased in outpatient services, but increased by 20% in inpatient services (Bollmann et al. 2021). A decrease in the utilization of heart failure diagnoses was also found in America during the pandemic (Blecker et al. 2021). Both studies strengthen the findings in this study, a decrease in the utilization of heart and cancer services for BPJS Kesehatan participants.

Decreased utilization also occurs in medical rehabilitation procedures and cataract surgery. Prior to the Covid pandemic, medical rehabilitation procedures and cataract surgery were the highest cases in outpatient services for BPJS Kesehatan participants. Further research is needed to determine the factors that influence the decrease in utilization. Previous study by Kanazawa et al. (2022) investigated the impact of the initial outbreak of coronavirus disease (COVID-19) on rehabilitation and functional outcomes of patients in Japanese hospitals during March-May 2020, found that the rehabilitation provision time for outpatients declined by 62% during the pandemic, while that for inpatients declined temporarily, and then increased. Compared with 2019 outcomes, rehabilitation

participation time was longer and hospital stay length was shorter for stroke and hip-fracture patients, the 30-day readmission rate was increased for hip-fracture patients, and improvement of activities in daily living was less for patients with congestive heart failure who were totally dependent at admission. Other outcomes did not change. Research in America on 180 patients in the waiting period for cataract surgery, found that 83% of patients still want to come to the hospital for cataract surgery even during the Covid pandemic (Sii et al. 2021). While in delivery services, the results of this study are the same as research findings in America, delivery services before and during the pandemic did not change (Haikin et al. 2021). The decrease in utilization will have an impact on hospital admissions. During the COVID-19 pandemic, hospital admissions in America decreased by up to 50% (Birkmeyer et al. 2020). The decrease in utilization that occurs in hospitals will cause a decrease in hospital receipts or reduce BPJS Kesehatan financing. The decrease in utilization during the pandemic raises several questions, such as whether the number of COVID-19 cases is related to utilization decreases, the utilization during the pandemic is a rational health service need, what types of services can be served at the first-level health facilities without having to go to the hospital, how do BPJS Kesehatan participants meet their health care needs during the pandemic, how to deal with deteriorating health status, especially for chronic disease sufferers who do not receive health services during the pandemic, and so on. To answer these questions, further research is needed.

## **Conclusion**

The results of this study describe a decrease in the utilization of health services for BPJS Kesehatan participants during the COVID-19 pandemic compared to 2020. The decline in utilization occurred in the six largest islands of Indonesia, Bali-Nusa Tenggara (central Indonesia) was the lowest decrease for outpatient and inpatient. Outpatient's highest decrease was in Maluku-Papua (eastern Indonesia) while inpatient decrease was in Sumatera and Sulawesi (western and central Indonesia). Over all for outpatient and inpatient decreases: based on age group were mostly under 19 years old, based on diagnosis was upper respiratory tract infection (URTI), based on medical procedures were dental procedures, eye procedures, and physiotherapy. This study recommends authorities to find out the most health services needed during the pandemic in each island, developing policies to minimizing the spread of COVID-19 such as medical tele-consulting based on diagnosis and age group which support effective financing for health services during the pandemic. Furthermore this study could be considered by policy makers to manage the need of health care facilities after the COVID-19 pandemic. Future research could be conducted to see the correlation between the utilization decreases and the number of COVID-19 cases in each island.

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