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Regional disparities in hospital utilization in Indonesia: A population study in 2018

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Strengths and limitations of this study

- This cross-sectional study relied on secondary data from the 2018 Indonesian Basic Health Survey.
- The research employed a weighted sample of 629,370 participants.
- The survey used household and individual instrument interviews to collect data.
- This study's strength includes a massive amount of data to express information on a national scale.
- The limitations include the use of secondary data; as a result, the study limited the variables that the acceptable variables could investigate. Previous research has identified several other factors associated with hospital utilization, such as travel costs, lifestyle, and disease type, which the authors cannot investigate.

Abstract

Objective Policymakers must ensure equal access to health services for the entire population. Efforts to minimize inequalities are a necessity. The study aims to analyze the regional disparities in hospital utilization in Indonesia.
Design A cross-sectional study. The study analyzed secondary data from the 2018 Indonesian Basic Health Survey.
Setting Indonesia at the national level.
Participants 629,370 participants.
Results The results show that someone in the Sumatra region has 1.079 times the likely than someone in the Papua region to utilize the hospital (95% CI 1.073-1.085). Someone in the Java-Bali region has 1.075 times the likely than someone in the Papua region to use the hospital (95% CI 1.069-1.081). Someone in the Nusa Tenggara region has 1.106 times more probability than someone in the Papua region to utilize the hospital (95% CI 1.099-1.113). Someone in the Sulawesi region has 1.008 times the likelihood of someone in the Papua region using the hospital (95% CI 1.002-1.014). Someone in the Kalimantan region has 1.212 times more likely than someone in the Papua region to use the hospital (95% CI 1.205-1.219). Someone in the Maluku region has 0.827 times less likely than someone in the Papua region to make a hospital utilization (95% CI 0.820-0.835).
Conclusion The study concluded that regional disparities existed in hospital utilization in Indonesia.
Ethics The 2018 Indonesian Basic Health Survey (LB.02.01/2/KE.024/2018) received Ethical Clearance from the National Ethics Committee.

Keywords: health disparity, hospital utilization, healthcare evaluation, healthcare access, public health.

Introduction

The health service referral system implements health services that regulate the delegation of duties and responsibilities of reciprocal health services, both vertically and horizontally. Every health service provider must refer patients when disease conditions or health problems require it.[1] Health service providers include all Health Facilities that work together with the Social Security Administrator for Health in first-level and advanced-level referral health facilities.[2] The study results show that the public's perception of health services is quite good, and the information on the flow of referrals is conveyed clearly. The referral request and referral process from public health care are straightforward. Patients get direct referrals for several visits to the hospital, so they don't have to return to Public Health Care often.[3] Implementing the referral system in public health care includes requirements for referring patients, clinical referral procedures, and administrative referral procedures to regulations and existing guidelines.[4] Referral services are one of the complete health care efforts.

The regulation of the health care system in Indonesia states that everyone has the same rights in obtaining access to resources in the health sector and obtaining safe, quality, and affordable health services. To reduce the risk of people bearing health costs out of pocket, in amounts that are difficult to predict and sometimes require very high prices, a guarantee in the form of health insurance is needed. Thus the health financing is borne jointly by all participants so that it is not burdensome for each person.[5] Health insurance ensures health protection so that participants receive health care benefits and safety in meeting primary health needs given to every individual—people who have paid dues or whose contributions are paid by the government. The service facilities used to organize individual health service efforts are health facilities.[2] A referral system is carried out when patients experience health problems that cannot be served at first-level health facilities. Based on the performance accountability report of government agencies in 2020, the performance achievement of Referral Hospitals and Vertical Hospitals with services according to standards is 59% (of the 70% target).[6]

Indonesia is a country with an archipelagic topography. The study results on health services in Indonesia reported a relationship between the feasibility of the service room with topography, demography, and geography. More service rooms are located in central/common areas compared to remote or very remote areas, more in non-border areas compared to border areas, more in non-archipelagic areas compared to archipelagic regions, in areas with a population of 30,000 people compared to other sites with a population of 30,000, more in urban areas than in rural areas.[7]. In general, the community believes that there are still perceived deficiencies in the accessibility of health services. Especially in physical access, due to poor facilities and infrastructure. In addition, it also felt that social access is lacking because there are still health workers who serve in a less friendly manner.[8] Other studies support that access to health services is related to Social Security Administrator membership,[9] while the location of residence affects access to health services.[10]

Previous studies have shown disparities between regions in Indonesia in terms of the utilization of hospital services. This disparity is related to a complex factor of individual characteristics through geographical barriers.[11] There is wide variation in districts in the utilization of health services in Indonesia. Cities have a higher level of utilization than rural areas [12]. In Indonesia, disparities in health development, especially the Healthy Family Indicator, still occur. Provinces in Eastern Indonesia with very low Healthy Family Indicators are Maluku, North Maluku, West Papua, and Papua (cluster 4). Provinces with High Healthy Family Indicators (cluster 3) comprise the Riau Islands, Jakarta, Yogyakarta, Bali, East Kalimantan, North

Kalimantan, South Sulawesi, and Gorontalo.[13] The Study on Maternal and Child Health in Papua shows that the input range for midwives and doctors in Papua Island is extensive; there is a very high variation between districts/cities in the input variable and performance.[14] Differences in urban-rural areas, travel time, and transportation costs predict hospital utilization for outpatients in Papua.[15,16] The delay in reporting the performance of Maternal and Child Health in Papua is caused by distance and geographical access that are difficult to reach and heavy workloads.[17] In addition, it was also found that the disparity in maternal mortality was caused by the medium factor gap between regencies/cities in Indonesia, with the risk of maternal mortality included.[18] Some areas still have limited access to essential health services in public health care. These obstacles can be seen from the minimal number of public health care and the gap in facilities between regions, the lack of various supporting factors, and the limited quantity of health workers that will affect public health outcomes.[19]

Policymakers must provide equitable health services. The government must have a policy to reduce disparities in health services in Indonesia.[20] The existing policy is the National Health System. National Health System is used as a reference in the approach to primary health care.[21] Furthermore, a guarantee is held in social health insurance or Nasional Health Insurance to ensure that the community gets health services. Social health insurance provides comprehensive benefits at affordable premiums. Social health insurance applies the principles of cost and quality control. The situation means that participants can get adequate quality services at reasonable and controlled prices.[5] The government needs a strategy to overcome the dynamics of health as an improvement in the policy framework to realize the targets of the Sustainable Development Goals (SDGs) in the health service sector in the regions. There needs to be a guarantee of certainty through Primary Health Care Improvement to improve the region's public health care services.[19] Based on the background narrative, the study aims to analyze the regional disparities in hospital utilization in Indonesia.

Methods

Study Design and Data Source

The study used secondary data from the 2018 Indonesian Basic Health Survey. Meanwhile, the survey was a national-scale cross-sectional poll by the Republic of Indonesia's Ministry of Health. The 2018 Indonesian Basic Health Survey pooled information from May to July 2018 through interviews with Household Instruments and Individual Instruments.

The 2018 Indonesian Basic Health Survey population is all households in Indonesia. The survey uses the 2018 National Socio-Economic Survey sample framework, conducted in March 2018. Moreover, the survey visited the target sample of 300,000 households from 30,000 of the 2018 Socio-Economic Survey census blocks (run by the Central Statistics Agency).[22]

The survey uses the PPS (probability proportional to size) method using systematic linear sampling, with Two-Stage Sampling: Stage 1: Implicit stratification of all census blocks resulting from the 2010 Population Census based on welfare strata. PPS selected the sample survey as the sampling frame for selecting census blocks from the master frame of 720,000 Census Blocks from the 2010 Population Census and 180,000 Census Blocks (25%). The survey determined several census blocks with the PPS method in each urban/rural strata per regency/city to produce a Census Block Sample List. The total number of selected Census Blocks is 30,000 Census Blocks. Stage 2: Selecting ten households in each Census Block updated by systematic sampling with the highest

implicit stratification of education completed by the Head of the Household to maintain the representation of the diversity value of household characteristics. Individuals sampled in the 2018 Indonesian Basic Health Survey be interviewed by all household members in the selected household.[22]

This study's population was all adults (≥ 15 years) in Indonesia. The study analyzed 629,370 respondents as a weighted sample based on the sampling methods.

Outcome Variable

The outcome variable of the study was hospital utilization. Hospital utilization was an adults' access to hospitals, whether outpatient or inpatient. Hospital utilization consists of two categories: unutilized and utilized. The study using outpatient hospitalizations was restricted to the previous month, whereas the survey determined inpatient hospitalizations to the past year. The poll requested this limit so respondents correctly recollect outpatient and inpatient incidents.[22]

Exposure Variable

The study employed the region as an exposure variable. The study classified the region into seven categories: Sumatera, Java-Bali, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua. The study classified the region according to the largest island in the area.[11,23]

Control Variables

The study used nine elements as control variables as part of those variables. The nine criteria were the type of residence, age group, gender, marital status, education level, occupation type, wealth status, health insurance ownership, and travel time to the hospital.

The study classified the type of residence into two categories: urban and rural. Furthermore, the study used the Indonesian Central Statistics Agency's provisions for urban-rural categorization in the survey. The study determined the age based on the last birthday that the respondent passed. The age group consists of three kinds: ≤ 17, 18-64, and ≥ 65. Gender, on the other hand, was divided into two categories: male and female. The marital status consists of three groups: never in a union, married/living with a partner, and divorced/widowed.

Education is their acknowledgment of their most recent diploma. The education level consists of four levels: no education, primary, secondary, and higher education. On the other hand, the study classified the occupation into six types: no work, civil servant/army/police, private sector, entrepreneur, farmer/fisherman/labor, and others.

The 2018 Indonesian Basic Health Survey used the wealth index formula to identify wealth status. The survey calculated the wealth index using a weighted average of a household's total spending. Meanwhile, the poll computed the wealth index using primary household expenditures such as health insurance, food, and lodging, among other things. Moreover, the survey divided the wealth index into five categories: the poorest, poorer, middle, richer, and the richest.[24] Furthermore, the study classified health insurance ownership into four groups: uninsured, government-run insurance, private-run insurance, and government-run and private-run insurance. Moreover, travel time consists of ≤ 1 hour and > 1 hour.

Data Analysis

The study used the Chi-Square test to analyze a bivariate comparison in the first step. Meanwhile, the study utilized a collinearity test to ensure that the independent variables did not have a strong connection in the final regression model. Moreover, the study used a binary logistic

regression. The study used the last test to analyze the multivariate relationship between all independent variables and hospital utilization. The study employed the IBM SPSS 26 throughout the statistical analysis phase of the investigation.

In contrast, the study used ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to map hospital utilization in Indonesia in 2018. The Indonesian Bureau of Statistics submitted a shapefile of administrative border polygons for analysis.

Patient and public involvement

No patient involvement

Ethical Approval

The National Ethics Committee granted Ethical Clearance to the 2018 Indonesian Basic Health Survey (LB.02.01/2/KE.024/2018). The survey removed the names of all respondents from the database due to the study.

Results

The analysis results found that Indonesia's national average hospital utilization in 2018 in this study was 5.5%. Moreover, Figure 1 informs the region distribution map of hospital utilization by the province in Indonesia in 2018. Figure 1 shows diverse variations among areas in the scope of hospital utilization in every region. Except in the Nusa Tenggara and Maluku regions, the figure shows the same low coverage of hospital utilization among provinces.

Table 1 shows descriptive statistics of regions and the respondents' characteristics. Based on hospital utilization, those in the Sulawesi region have the highest hospital utilization than those in the other areas. Regarding the residence type, those who live in rural dominated all parts, except in the Java-Bali region, which is dominated live in urban areas. Based on the age group, the Papua region has the 18-64 groups, which are the largest compared to the other areas.

Meanwhile, according to gender, males ruled in Sumatra, Kalimantan, Maluku, and Papua regions. In contrast, females led in Java-Bali, Nusa Tenggara, and the Sulawesi region. Based on marital status and education level, those who married or lived with a partner and primary education occupied all areas.

On the other hand, based on occupation type, those who do not work ruled all regions, except in the Nusa Tenggara and Papua regions. The richest led in Java-Bali, Kalimantan, and Papua regions according to wealth status. Meanwhile, the poorest led in Nusa Tenggara and Sulawesi region.

Besides, regarding health insurance ownership, government-run insurance dominated in all-region. Moreover, based on travel time to the hospital, the ≤ 1 hour travel time ruled in all-region.

The following analysis was the collinearity test. The collinearity test indicates no strong association between the independent variables. All variables' tolerance value is more significant than 0.10. On the other hand, all factors' variance inflation factor (VIF) value is less than 10.00. The results then concluded that the regression model exhibited no signs of multicollinearity.

Table 2 informs the binary logistic regression result of hospital utilization in Indonesia in 2018. The study employed "unutilized hospital" as a reference in this stage.

Table 2 shows the disparity between regions in hospital utilization in Indonesia in 2018. Someone in the Sumatra region has 1.079 times the probability of someone in the Papua region to utilize the hospital (AOR 1.079; 95% CI 1.073-1.085). Someone in the Java-Bali region has 1.075 times the likely than someone in the Papua region to use the hospital (AOR 1.075; 95% CI 1.069-1.081). Someone in the Nusa Tenggara region has 1.106 times more probability than someone in the Papua region to utilize the hospital (AOR 1.106; 95% CI 1.099-1.113). Someone in the Sulawesi region has 1.008 times the probability of someone in the Papua region to utilize the hospital (AOR 1.008; 95% CI 1.002-1.014). Meanwhile, someone in the Kalimantan region has 1.212 times more likely than someone in the Papua region to use the hospital (AOR 1.212; 95% CI 1.205-1.219). Moreover, someone in the Maluku region has 0.827 times less likely than someone in the Papua region to make a hospital utilization (AOR 0.827; 95% CI 0.820-0.835). Sequentially, hospital utilization starting from the lowest is Maluku, Papua, Sulawesi, Java-Bali, Sumatra, Nusa Tenggara, and Kalimantan region.

Table 2 also informs six demographic variables that have a relationship to hospital utilization in Indonesia. The six variables are age group, gender, marital status, education level, occupation type, and wealth status. The older you are, the higher your chances of utilizing the hospital are based on age. Furthermore, regarding gender, females have a higher probability than males of using the hospital.

On the other hand, the study found that all control variables were also significantly related to hospital utilization in Indonesia. Someone living in an urban area has 1.135 times more likely than someone living in a rural area to utilize the hospital (AOR 1.135; 95% CI 1.133-1.137).

Table 1. Descriptive statistic of regions and the respondents characteristics (n=629,370)

Characteristics	Region							p-value
	Sumatera (n=188,111)	Java-Bali (n=227,337)	Nusa Tenggara (n=38,145)	Kalimantan (n=61,598)	Sulawesi (n=81,675)	Maluku (n=14,625)	Papua (n=17,879)	
Hospital utilization								< 0.001
Unutilized	94.9%	94.3%	95.7%	95.0%	94.1%	96.5%	95.1%	
Utilized	5.1%	5.7%	4.3%	5.0%	5.9%	3.5%	4.9%	
Residence type								
Urban	42.8%	64.5%	35.8%	46.9%	39.4%	38.3%	31.7%	
Rural	57.2%	35.5%	64.2%	53.1%	60.6%	61.7%	68.3%	
Age (mean)								< 0.001
≤ 17 years	7.9%	6.7%	9.0%	7.5%	8.1%	9.5%	6.4%	
18-64 years	85.7%	84.3%	83.5%	87.0%	84.2%	84.5%	91.1%	
≥ 65 years	6.4%	9.0%	7.5%	5.5%	7.8%	6.0%	2.5%	
Gender								
Male	50.3%	49.6%	48.0%	51.5%	49.2%	50.2%	52.6%	
Female	49.7%	50.4%	52.0%	48.5%	50.8%	49.8%	47.4%	
Marital status								< 0.001
Never in union	25.0%	21.9%	25.3%	23.4%	25.2%	26.2%	19.7%	
Married/Living with a partner	67.9%	69.2%	66.6%	69.4%	66.4%	66.7%	74.5%	
Divorced/Widowed	7.1%	9.0%	8.0%	7.3%	8.4%	7.1%	5.8%	
Education level								< 0.001
No education	3.6%	6.0%	10.1%	5.2%	5.7%	2.8%	17.7%	
Primary	55.8%	58.6%	57.5%	59.2%	57.0%	52.5%	47.1%	
Secondary	31.9%	27.5%	23.4%	27.0%	27.3%	33.9%	25.9%	
Higher	8.6%	7.9%	9.0%	8.5%	10.1%	10.7%	9.2%	
Occupation								< 0.001
No work	37.5%	37.5%	34.9%	35.6%	41.3%	37.8%	32.0%	
Civil servant/army/police	3.5%	2.2%	3.8%	4.3%	4.1%	6.9%	6.6%	
Private sector	6.1%	12.5%	5.4%	11.9%	5.1%	3.6%	5.8%	
Entrepreneur	14.4%	15.3%	9.2%	13.8%	10.8%	7.6%	10.1%	
Farmer/fisherman/labor	32.7%	27.7%	39.4%	27.5%	29.2%	33.4%	41.4%	
Others	5.8%	4.7%	7.3%	6.9%	9.4%	10.5%	4.1%	

Characteristics	Region							p-value
	Sumatera (n=188,111)	Java-Bali (n=227,337)	Nusa Tenggara (n=38,145)	Kalimantan (n=61,598)	Sulawesi (n=81,675)	Maluku (n=14,625)	Papua (n=17,879)	
Wealth status								< 0.001
Poorest	12.4%	18.1%	31.9%	7.0%	24.8%	16.4%	22.3%	
Poorer	19.8%	18.4%	21.1%	15.9%	17.6%	19.2%	11.2%	
Middle	22.4%	18.2%	18.4%	22.4%	18.2%	23.3%	12.8%	
Richer	23.8%	19.6%	14.9%	24.8%	18.7%	22.5%	19.4%	
Richest	21.7%	25.7%	13.6%	29.8%	20.7%	18.6%	34.4%	
Health Insurance								< 0.001
Uninsured	32.9%	32.9%	35.5%	37.6%	27.2%	38.6%	16.1%	
Government-run insurance	63.5%	62.1%	63.6%	57.4%	70.9%	60.8%	82.3%	
Private-run insurance	2.8%	3.8%	0.6%	3.9%	1.5%	0.4%	1.0%	
Government-run and Private-run insurance	0.8%	1.3%	0.3%	1.1%	0.4%	0.1%	0.6%	
Travel time								
≤ 1 hour	75.1%	87.5%	68.7%	68.2%	75.1%	60.4%	53.4%	
> 1 hour	24.9%	12.5%	31.3%	31.8%	24.9%	39.6%	46.6%	

Table 2. The result of binary logistic regression of hospital utilization in Indonesia in 2018 (n=629,370)

Predictor	Hospital Utilization			
	p-value	AOR	95% CI	
			Lower Bound	Upper Bound
Region: Sumatera	**< 0.001	1.079	1.073	1.085
Region: Java-Bali	**< 0.001	1.075	1.069	1.081
Region: Nusa Tenggara	**< 0.001	1.106	1.099	1.113
Region: Sulawesi	*0.009	1.008	1.002	1.014
Region: Kalimantan	**< 0.001	1.212	1.205	1.219
Region: Maluku	**< 0.001	0.827	0.820	0.835
Region: Papua	-	-	-	-
Residence: Urban	**< 0.001	1.135	1.133	1.137
Residence: Rural	-	-	-	-
Age: ≤ 17 years	-	-	-	-
Age: 18-64 years	**< 0.001	1.387	1.381	1.392
Age: ≥ 65 years	**< 0.001	3.072	3.059	3.086
Gender: Male	-	-	-	-
Gender: Female	**< 0.001	1.200	1.198	1.201
Marital: Never in union	-	-	-	-
Marital: Married/Living with partner	**< 0.001	2.339	2.334	2.345
Marital: Divorced/Widowed	**< 0.001	1.948	1.942	1.954
Education: No Education	-	-	-	-
Education: Primary	**< 0.001	1.161	1.157	1.164
Education: Secondary	**< 0.001	1.111	1.108	1.115
Education: Higher	**< 0.001	1.190	1.186	1.194
Occupation: no work	-	-	-	-
Occupation: civil servant/army/police	**< 0.001	0.683	0.681	0.685
Occupation: private sector	**< 0.001	0.580	0.579	0.582
Occupation: entrepreneur	**< 0.001	0.658	0.657	0.660
Occupation: farmer/fisherman/labor	**< 0.001	0.573	0.571	0.574
Occupation: others	**< 0.001	0.837	0.835	0.839
Wealth: Poorest	-	-	-	-
Wealth: Poorer	**< 0.001	1.247	1.244	1.251
Wealth: Middle	**< 0.001	1.520	1.516	1.523
Wealth: Richer	**< 0.001	1.856	1.852	1.861
Wealth: Richest	**< 0.001	2.534	2.528	2.540
Insurance: Uninsured	-	-	-	-
Insurance: Government-run	**< 0.001	2.940	2.934	2.945
Insurance: Private-run	**< 0.001	2.928	2.918	2.938
Insurance: Government-run & Private-run	**< 0.001	5.096	5.073	5.119
Travel time: ≤ 1 hour	**< 0.001	1.475	1.471	1.478
Travel time: > 1 hour	-	-	-	-

Note: ∗p < 0.010; ∗∗p < 0.001; AOR: Adjusted Odds Ratio; CI: confidence interval.

According to marital status, all marital status has a better chance of using the hospital than someone never in a union. Based on education level, all education level has a higher probability of utilizing the hospital than no education. Regarding occupation type, all

occupations have a better chance of using the hospital than no work. Moreover, based on wealth status, Table 2 indicates that the richer a person is, the higher the probability of utilizing the hospital.

Based on health insurance ownership, someone with government-run insurance is 2.940 times more likely to use the hospital than the uninsured (AOR 2.940; 95% CI 2.934-2.945). Someone with private-run insurance has 2.928 times more likely than the uninsured to utilize the hospital (AOR 2.928; 95% CI 2.918-2.938). Furthermore, someone with government-run and private-run insurance has a possibility 5.096 times more likely than the uninsured to use the hospital (AOR 5.096; 95% CI 5.073-5.119).

According to travel time to the hospital, someone with ≤ 1-hour travel time has a possibility 1.475 times more likely than someone with > 1-hour travel time to utilize the hospital (AOR 1.475; 95% CI 1.471-1.478). The result indicates that shorter travel time increases the possibility of using the hospital.

Discussion

The study result shows that the disparity between regions in hospital utilization still exists in Indonesia in 2018. Geographical differences in access to health services are undeniable. As is known, Indonesia is a country consisting of islands with different geographical conditions. The unequal population concentration between regions exacerbates the situation; it has implications for developing health service facilities, including unevenly distributed hospitals.[11] Many hospitals or health facilities are built in densely populated areas for economic reasons. So it is not surprising that the distance is close to each other. Indirectly this makes it easier for people to take advantage of it.[25]

Meanwhile, in sparsely populated areas, such as Papua, the construction of hospitals is minimal, and people have to travel tens of kilometers to take advantage of it. Conditions are more difficult when the terrain is hills and mountains.[14,15] In the United States, racial and ethnic minority populations also experience differences in health and health care that arise from interacting factors, including racism and discrimination, social factors, access and quality of health care, individual behavior, and biology.[26] It is necessary to understand the culture, behavior, and elements in the health system that contribute to these disparities.[27]

The study found that someone living in an urban area is more likely to utilize the hospital than someone living in a rural area. This finding aligns with the research results on women in Sub-Saharan African countries accessing health services. This study indicates that women living in urban areas are 1.25 times more likely to use health services than women in rural areas.[28] The situation is also the case with the research results in China. Research on older adults shows that older people in rural areas have inadequate access to health services than more senior people in urban areas.[29] The results of other studies also show similar results. People who live in urban areas have a greater likelihood of getting health care, undergoing outpatient care, or hospitalization than people living in rural areas.[30] It is undeniable that there are differences between urban and rural areas regarding the availability of health care facilities. In urban areas, health service facilities are relatively adequate. Meanwhile, these facilities are very limited in rural areas and not infrequently even non-existent. The lack or absence of these health service facilities causes people in rural areas not to use health services more minor.[31]

The results inform that the older you are, the higher your chances of utilizing the hospital are based on age. Furthermore, regarding gender, females have a higher probability than males of using the hospital. The older a person gets, the more likely that person is to suffer from degenerative diseases such as hypertension, heart failure, stroke, diabetes mellitus, kidney failure, and other chronic diseases such as cancer, stroke, etc. So it is not surprising that the

older you get, the more likely you are to use health care facilities for both outpatient and inpatient care.[32,33] In contrast to the results of this study, research on the use of outpatient services in first-level health facilities and advanced health facilities shows that it is used more by men than women.[34]

All marital status has a better chance of using the hospital than someone never in a union. In addition, all education levels have a higher probability of utilizing the hospital than no education. A person who lives without a partner is less likely to have a companion when going to a health facility than people who have a partner or married people. So it is not surprising that access to health facilities is much lower than for people who have a partner. Research specifically on women in Tanzania states that apart from poverty, unemployment, and increasing age, those who do not have a partner will have more significant problems accessing health services than those with a partner.[35,36] In addition, the higher a person's level of education, the better the level of knowledge, including knowledge of health. The results of previous studies indicate that a good level of health knowledge is associated with increased visits to health care facilities, health checks, and a person's health status.[37] Several previous studies have found that education is a strong determinant of various outputs in the health sector.[38–40]

All occupations have a better chance of using the hospital than no work. Moreover, the wealthier a person is, the higher the probability of utilizing the hospital. In general, the reward/wages for people who work are in the form of money and not goods (food, clothing, etc.). Working means that a person will have money that can be used to meet their daily needs, including paying for health services.[35,41] On the other hand, hospital care costs are relatively higher than services at primary health facilities, especially if you have to be hospitalized. The condition is undoubtedly an obstacle for people who do not work, have no income, or the poor, especially if they do not have health insurance.[42] People who work with better economic status have a high chance of taking advantage of the hospital.[43] So, it is not surprising that the richer a person will have a more remarkable ability to access health services at the hospital than the poor.

Meanwhile, the study shows that health insurance can increase hospital utilization. The study results in the capital city of Iran, Tehran, show that one of the reasons people do not take advantage of health care facilities and choose to do a treatment at home. The condition is because they do not have sufficient funds or because the cost of health services is high.[44] Improved access to health care facilities for both outpatient and inpatient, including increased routine care for chronic conditions and improved quality of health care for low-income people, is associated with expanded coverage of health insurance programs.[45] In addition, the health financing scheme assistance provided by the government can increase the use of health services for the rural poor.[46] The results of previous studies indicate that barriers to access and financing are related to the use of health services; mothers who have health insurance and have a higher economic status have a more excellent opportunity to take advantage of health services.[47,48]

Based on time travel to the hospital, the 10 minutes time travel has more likely than the >10 minutes time travel to utilize the hospital. It is undeniable that distance significantly affects the utilization of health care facilities, and the close distance increases the possibility of accessing health care facilities if they experience health problems. On the other hand, long distances cause a person to be reluctant to access health services, especially if you don't have adequate transportation, no public transportation, and poor road conditions.[49] So, a disadvantage for people living in rural areas in accessing health care facilities is a longer travel time than people living in urban areas.[50] The study results confirm the results of previous studies that the close distance to the hospital increases repeats visits for inpatients.[51,52]

Strength and Limitation

The research examines big data to provide information on a national scale. On the other hand, because the study is based on secondary data, the variables evaluated are limited to acceptable ones. Other factors linked to hospital utilization that have been established in previous studies, such as the cost of travel to the hospital and the kind of disease, cannot be investigated.[15,53,54]

Conclusion

The study concludes that regional disparities existed in hospital utilization in Indonesia based on the results. Those who live in urban areas have a better chance of using hospitals in Indonesia.

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References

1. Kemenkes R. Peraturan Menteri Kesehatan Republik Indonesia Nomor 001 Tahun 2012 tentang Sistem Rujukan Pelayanan Kesehatan Perorangan. Jakarta Indonesia; 2012. Report No.: Nomor 001.
2. the Minister of Health of the Republic of Indonesia. Regulation of the Minister of Health of the Republic of Indonesia Number 71 of 2013 concerning Health Services in the National Health Insurance. Jakarta, Indonesia: Kementerian Kesehatan Republik Indonesia; 2013 p. 28.
3. Nurlinawati I, Rosita R. Persepsi Peserta JKN Terhadap Penyelenggara Pelayanan Kesehatan Rujukan. J Penelit dan Pengemb Pelayanan Kesehat. 2018;2(1):38–46.
4. Ratnasari D. Analisis Pelaksanaan Sistem Rujukan Berjenjang Bagi Peserta JKN di Puskesmas X Kota Surabaya. J Adm Kesehat Indones. 2017;5(2):145–54.
5. Kemenkes. Buku Panduan Jaminan Kesehatan Nasional (JKN) Bagi Populasi Kunci. Www.Jkn.Kemkes.Go.Id. Jakarta Indonesia; 2016. 3–4 p.
6. Direktorat Pelayanan Kesehatan. Rujukan. Laporan Akuntabilitas Kinerja Instansi Pemerintah. Jakarta Indonesia: Kementerian Kesehatan Republik Indonesia; 2020. 77 p.
7. Rukmini, Rosiehemiatie B, Nantabah Z. Ketersediaan Dan Kelayakan Ruangan Pelayanan Puskesmas Berdasarkan Topografi, Demografi Dan Geografi Di Indonesia. Bul Penelit Sist Kesehat. 2012;15(4):408–17.
8. Megatsari H, Dwi Laksono A, Akhsanu Ridlo I, Yoto M, Nur Azizah A, Promosi Kesehatan dan Ilmu Perilaku D, et al. Perspektif Masyarakat Tentang Akses Pelayanan Kesehatan Community Perspective about Health Services Access. Bul Penelit Sist Kesehat. 2018;21(4):247–53.
9. Lestari PAP, Roesdiyanto R, Ulfah NH. Kebutuhan Kesehatan dan Akses Pelayanan Kesehatan dengan Kepesertaan Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan. J Penelit dan Pengemb Kesehat Masy Indones. 2020;1(2):138–56.
10. Maulany RF, Dianingati RS, Annisaa' E. Faktor-Faktor yang Mempengaruhi Akses Kesehatan. Indones J Pharm Nat Prod. 2021;4(2):142–9.
11. Mahmudiono T, Laksono AD. Disparity in the hospitals utilization among regions in Indonesia. Open Access Maced J Med Sci. 2021;9:1461–6.
12. Mulyanto J, Kunst AE, Kringos DS. Geographical inequalities in healthcare utilisation and the contribution of compositional factors: A multilevel analysis of 497 districts in Indonesia. Heal Place. 2019;60(October):102236.
13. Maryani H, Kristiana L, Paramita A, Izza N. Disparitas Pembangunan Kesehatan di Indonesia Berdasarkan Indikator Keluarga Sehat Menggunakan Analisis Cluster. Bul Penelit Sist Kesehat. 2020;23(1):18–27.
14. Wulandari RD, Laksono AD, Matahari R, Rohmah N, Krismawati H. Performance of Maternal and Child Health Services in Papua in 2018: Does the input of midwives and doctors have an effect? (Kinerja Pelayanan Kesehatan Ibu dan Anak di Papua Tahun 2018: Apakah input tenaga bidan dan dokter berpengaruh?). Bul Penelit Sist Kesehat. 2021;24(4):275–85.
15. Laksono AD, Wulandari RD. Predictors of hospital utilization among papuans in Indonesia. Indian J Forensic Med Toxicol. 2020;14(2):2319–24.
16. Laksono AD, Wulandari RD, Soedirham O. Urban and Rural Disparities in Hospital

Utilization among Indonesian Adults. Iran J Public Health. 2019;48(2):247–55.
17. Kareth Y, Purnami CT, Sriatmi A. Evaluation on the Implementation of Maternal and Child Health Service Reporting by Coordinator Midwives at Primary Healthcare Centers in Nabire District, Papua Province. J Manaj Kesehat Indones. 2015;3(1):1–10.
18. Nurrizka RH, Wahyono TYM. Disparitas Kematian Maternal di Indonesia: Studi Ekologi dengan Analisis Spasial. Media Kesehat Masy Indones. 2018;14(2):119–27.
19. Kusworo DL, Nur M, Fauzi K, Pratama AA, Kusworo DL, Nur M, et al. Primary Health Care Improvement: Jaminan Pelayanan Kesehatan Di Daerah Terdampak Pada Masa Mitigasi Covid-19. Khatulistiwa Law Rev. 2021;2(2):329–47.
20. Wulandari RD, Laksono AD, Nantabah ZK, Rohmah N, Zuardin Z. Hospital utilization in Indonesia in 2018: do urban-rural disparities exist? BMC Health Serv Res. 2022;2022(22):491.
21. Putri RN. Perbandingan Sistem Kesehatan di Negara Berkembang dan Negara Maju. J Ilm Univ Batanghari Jambi. 2019;19(1):139.
22. National Institute of Health Research and Development of the Ministry of Health of the Republic of Indonesia. The 2018 Indonesian Basic Health Survey [Internet]. Jakarta; 2018 [cited 2021 Oct 7]. p. 99. Available from: http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
23. Laksono AD, Wulandari RD, Soedirham O. Regional Disparities of Health Center Utilization in Rural Indonesia. Malaysian J Public Heal Med. 2019;19(1):158–66.
24. Wulandari RD, Qomarrudin MB, Supriyanto S, Laksono AD. Socioeconomic Disparities in Hospital Utilization among Elderly People in Indonesia. Indian J Public Heal Res Dev. 2019;10(11):1800–4.
25. Laksono AD, Wulandari RD. Regional disparities of facility-based childbirth in Indonesia. Trends Sci. 2021;18(21):387.
26. Serchen J, Doherty R, Atiq O, Hilden D. A Comprehensive Policy Framework to Understand and Address Disparities and Discrimination in Health and Health Care: A Policy Paper From the American College of Physicians. Ann Intern Med. 2021 Apr;174(4):529–32.
27. Wasserman J, Palmer RC, Gomez MM, Berzon R, Ibrahim SA, Ayanian JZ. Advancing Health Services Research to Eliminate Health Care Disparities. Am J Public Health. 2019;109(S1):S64–9.
28. Tessema ZT, Worku MG, Tesema GA, Alamneh TS, Teshale AB, Yeshaw Y, et al. Determinants of accessing healthcare in Sub-Saharan Africa: A mixed-effect analysis of recent Demographic and Health Surveys from 36 countries. BMJ Open. 2022;12(1):1–8.
29. Zhang X, Dupre ME, Qiu L, Zhou W, Zhao Y, Gu D. Urban-rural differences in the association between access to healthcare and health outcomes among older adults in China. BMC Geriatr. 2017;17(1):1–11.
30. Li J, Shi L, Liang H, Ding G, Xu L. Urban-rural disparities in health care utilization among Chinese adults from 1993 to 2011. BMC Health Serv Res. 2018;18(102):1–9.
31. Wulandari RD, Laksono AD, Rohmah N. Urban-rural disparities of antenatal care in South East Asia: a case study in the Philippines and Indonesia. BMC Public Health. 2021;21(1):1221.
32. Pratiwi NL, Rachmawaty T, Angkasawati TJ, Suharmiati S, Lestari H, Laksono AD. Dietary Pattern and Physical Activity Related to Hypertension in Indonesia. Indian J Forensic Med Toxicol. 2021;15(3):3802–10.
33. Ridwanah AA, Megatsari H, Laksono AD. Hypertension in Indonesia in 2018 : An Ecological Analysis. 2020;(December).

34. Valentina R, Pujianto. Factors Related to The Use of Outpatient. J Heal Sci. 2019;13(1):12–6.
35. Bintabara D, Nakamura K, Seino K. Improving access to healthcare for women in Tanzania by addressing socioeconomic determinants and health insurance: a population-based cross-sectional survey. BMJ Open. 2018;8(9):1–7.
36. Megatsari H, Laksono AD, Herwanto YT, Sarweni KP, Geno RAP, Nugraheni E, et al. Does husband/partner matter in reduce women's risk of worries?: Study of psychosocial burden of covid-19 in indonesia. Indian J Forensic Med Toxicol. 2021;15(1):1101–6.
37. Megatsari H, Laksono AD, Ridlo IA, Yoto M, Azizah AN. Community Perspective about Health Services Access. Bull Heal Syst Res. 2018;21:247–253.
38. Ipa M, Widawati M, Laksono AD, Kusrini I, Dhewantara PW. Variation of preventive practices and its association with malaria infection in eastern Indonesia: Findings from community-based survey. PLoS One. 2020;15(5):e0232909.
39. Wulandari RD, Laksono AD. Education as predictor of the knowledge of pregnancy danger signs in Rural Indonesia. Int J Innov Creat Chang. 2020;13(1):1037–51.
40. Putri NK, Laksono AD. Predictors of childbirth services in Indonesia. Int J Public Heal Sci. 2022;11(2):566–73.
41. Denny HM, Laksono AD, Matahari R, Kurniawan B. The Determinants of Four or More Antenatal Care Visits Among Working Women in Indonesia. Asia-Pacific J Public Heal. 2022;34(1):51–6.
42. Guo B, Xie X, Wu Q, Zhang X, Cheng H, Tao S, et al. Inequality in the health services utilization in rural and urban China: A horizontal inequality analysis. Med (United States). 2020;99(2):1–7.
43. Wulandari RD, Laksono AD, Prasetyo YB, Nandini N. Socioeconomic Disparities in Hospital Utilization Among Female Workers in Indonesia: A Cross-Sectional Study. J Prim Care Community Health. 2022;I3(2):1–7.
44. Motlagh SN, Mahani AS, Barooni M, Lari MA, Mahdavi MRV, Hadian M. Determining factors related to health services utilization: case of Tehran Soraya. Razi J Med Sci. 2015;21(127):60–72.
45. Mao W, Tang Y, Tran T, Pender M, Khanh PN, Tang S. Advancing universal health coverage in China and Vietnam: lessons for other countries. BMC Public Health. 2020;20(1):1–9.
46. Laksono AD, Wulandari RD, Zuardin Z, Nopianto N. The disparities in health insurance ownership of hospital-based birth deliveries in eastern Indonesia. BMC Health Serv Res. 2021;21(1):1261.
47. Wulandari RD, Laksono AD, Matahari R. The Effects of Health Insurance on Maternity Care in Health Services in Indonesia. Int J Innov Creat Chang. 2020;14(2):478–97.
48. Andayani Q, Koesbardiati T, Prahastuti AD, Masruroh M, Laksono AD. The Barrier to Access Health Insurance for Maternity Care: Case Study of Female Workers in Indonesia. Medico-Legal Updat. 2021;21(2):926–32.
49. Varela C, Young S, Mkandawire N, Groen RS, Banza L, Viste A. Transportation Barriers to Access Health Care for Surgical Conditions in Malawi: a cross sectional nationwide household survey 11 Medical and Health Sciences 1117 Public Health and Health Services. BMC Public Health. 2019;19(1):Article number 264.
50. Yiengprugsawan VS, Dorj G, Dracakis JG, Batkhorol B, Lkhagvaa U, Battsengel D, et al. Disparities in outpatient and inpatient utilization by rural-urban areas among older Mongolians based on a modified WHO-SAGE instrument. BMC Health Serv Res. 2021;21(183):1–10.
51. Jumriati, Satrianegara MF, Habibi. Reutilization of Health Services by General Inpatients at Sheikh Yusuf Hospital in 2019. Higiene. 2020;6(1):1–7.

52. Laksono AD, Wulandari RD. Determinant of the Puskesmas Utilization in Madura Island. Indian J Public Heal Res Dev. 2019;10(11):576–81.
53. Laksono AD, Wulandari RD, Efendi F. Determinants of hospital utilisation among urban poor societies in Indonesia. Int J Innov Creat Chang. 2020;12(9):375–87.
54. Wei Y, Yu H, Geng J, Wu B, Guo Z, He L, et al. Hospital efficiency and utilization of high-technology medical equipment: A panel data analysis. Heal Policy Technol. 2018;7(1):65–72.

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

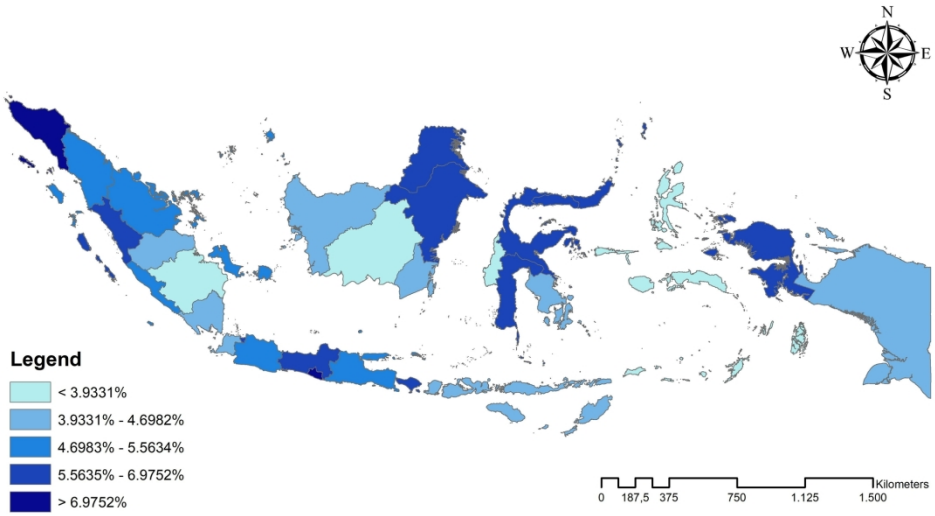

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

191x108mm (300 x 300 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	4-5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5-6
		(*b*) Describe any methods used to examine subgroups and interactions	5-6
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11

		(*b*) Report category boundaries when continuous variables were categorized	6-8
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
		Discussion	
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12
		Other information	
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Regional disparities in hospital utilization in Indonesia: An analysis of cross-sectional data from the 2018 Indonesian Basic Health Survey

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Abstract

Objective Policymakers must ensure equal access to health services for the entire population. Efforts to minimize inequalities are a necessity. The study aims to analyze the regional disparities in hospital utilization in Indonesia.

Design A cross-sectional study. The study analyzed secondary data from the 2018 Indonesian Basic Health Survey.

Setting Indonesia at the national level.

Participants 629,370 participants.

Results The results show that someone in the Sumatra region is 1.079 times more likely than someone in the Papua region to utilize the hospital (95% CI 1.073-1.085). Someone in the Java-Bali region is 1.075 times more likely than someone in the Papua region to use the hospital (95% CI 1.069-1.081). Someone in the Nusa Tenggara region is 1.106 times more likely than someone in the Papua region to utilize the hospital (95% CI 1.099-1.113). Someone in the Sulawesi region is 1.008 times more likely than someone in the Papua region to use the hospital (95% CI 1.002-1.014). Someone in the Kalimantan region is 1.212 times more likely than someone in the Papua region to use the hospital (95% CI 1.205-1.219). Someone in the Maluku region is 0.827 times less likely than someone in the Papua region to make a hospital utilization (95% CI 0.820-0.835). The study also found six demographic variables related to hospital utilization: age, gender, marital, education, occupation, and wealth, including another three control variables: residence, insurance, and travel time to the hospital.

Conclusion The study concluded that regional disparities existed in hospital utilization in Indonesia.

Keywords: health disparity, hospital utilization, healthcare evaluation, healthcare access, public health.

Strengths and limitations of this study

- This cross-sectional study relied on secondary data from the 2018 Indonesian Basic Health Survey.
- The research employed a weighted sample of 629,370 participants.
- The survey used household and individual instrument interviews to collect data.
- This study's strength includes a massive amount of data to express information on a national scale.
- The limitations include the use of secondary data; as a result, the study limited the variables that the acceptable variables could investigate. Previous research has identified several other factors associated with hospital utilization, such as travel costs, lifestyle, and disease type, which the authors cannot investigate.

Introduction

The health service referral system implements health services that regulate the delegation of duties and responsibilities of reciprocal health services vertically and horizontally. Every health service provider must refer patients when disease conditions or health problems require it.[1] Health service providers include all Health Facilities that work together with the Social Security Administrator for Health in first-level and advanced-level referral health facilities.[2] The study results show that the public's perception of health services is quite good, and the information on the flow of referrals is conveyed clearly. The referral request and referral process from public health care are straightforward. Patients get direct referrals for several visits to the hospital, so they don't have to return to Public Health Care often.[3] Implementing the referral system in public health care includes requirements for referring patients, clinical referral procedures, and administrative referral procedures to regulations and existing guidelines.[4] Referral services are one of the complete health care efforts.

The regulation of the health care system in Indonesia states that everyone has the same rights in obtaining access to health sector resources and safe, quality, and affordable health services. To reduce the risk of people bearing health costs out of pocket, in amounts that are difficult to predict and sometimes require very high prices, a guarantee in the form of health insurance is needed. Thus the health financing is borne jointly by all participants so that it is not burdensome for each person.[5] Health insurance ensures health protection so that participants receive health care benefits and safety in meeting primary health needs to be given to everyone—people who have paid dues or whose contributions are paid by the government. The service facilities used to organize individual health service efforts are health facilities.[2] A referral system is carried out when patients experience health problems that cannot be served at first-level health facilities. Based on the performance accountability report of government agencies in 2020, the performance achievement of Referral Hospitals and Vertical Hospitals with services according to standards is 59% (of the 70% target).[6]

Indonesia is a country with an archipelagic topography. The study results on health services in Indonesia reported a relationship between the feasibility of the service room with topography, demography, and geography. More service rooms are located in central/common areas compared to remote or very remote areas, more in non-border areas compared to border areas, more in non-archipelagic areas compared to archipelagic regions, in areas with a population of 30,000 people compared to other sites with a population of 30,000, more in urban areas than in rural areas.[7] In general, the community believes that there are still perceived deficiencies in the accessibility of health services. Especially in physical access due to poor facilities and infrastructure. In addition, it also felt that social access is lacking because there are still health workers who serve in a less friendly manner.[8] Other studies support that access to health services is related to Social Security Administrator membership,[9] while the location of residence affects access to health services.[10]

Previous studies have shown disparities between regions in Indonesia in terms of the utilization of hospital services. This disparity is related to a complex factor of individual characteristics through geographical barriers.[11] There is wide variation in districts in the utilization of health services in Indonesia. Cities have a higher level of utilization than rural areas [12]. In Indonesia, disparities in health development, especially the Healthy Family Indicator, still occur. Provinces in Eastern Indonesia with very low Healthy Family Indicators are Maluku, North Maluku, West Papua, and Papua (cluster 4). Provinces with High Healthy Family Indicators (cluster 3) comprise the Riau Islands, Jakarta, Yogyakarta, Bali, East Kalimantan, North

Kalimantan, South Sulawesi, and Gorontalo.[13] The Study on Maternal and Child Health in Papua shows that the input range for midwives and doctors in Papua Island is extensive; there is a very high variation between districts/cities in the input variable and performance.[14] Differences in urban-rural areas, travel time, and transportation costs predict hospital utilization for outpatients in Papua.[15,16] The delay in reporting the performance of Maternal and Child Health in Papua is caused by distance and geographical access that are difficult to reach and heavy workloads.[17] In addition, a previous study reported that the disparity in maternal mortality was caused by the medium factor gap between regencies/cities in Indonesia, with the risk of maternal mortality included.[18] Some areas still have limited access to essential health services in public health care. These obstacles can be seen from the minimal number of public health care and the gap in facilities between regions, the lack of various supporting factors, and the limited quantity of health workers that will affect public health outcomes.[19]

Policymakers must provide equitable health services. The government must have the policy to reduce disparities in health services in Indonesia.[20] The existing policy is the National Health System, and the government used the system as a reference in the approach to primary health care.[21] Furthermore, a guarantee is held in social health insurance or Nasional Health Insurance to ensure that the community gets health services. Social health insurance provides comprehensive benefits at affordable premiums. Social health insurance applies the principles of cost and quality control. The situation means that participants can get adequate quality services at reasonable and controlled prices.[5] The government needs a strategy to overcome the dynamics of health as an improvement in the policy framework to realize the Sustainable Development Goals (SDGs) targets in the health service sector in the regions. There needs to be a guarantee of certainty through Primary Health Care Improvement to improve the region's public healthcare services.[19] Based on the background narrative, the study aims to analyze Indonesia's regional disparities in hospital utilization.

Methods

Study Design and Data Source

The study used secondary data from the 2018 Indonesian Basic Health Survey. Meanwhile, the survey was a national-scale cross-sectional poll by the Republic of Indonesia's Ministry of Health. The 2018 Indonesian Basic Health Survey pooled information from May to July 2018 through interviews with Household Instruments and Individual Instruments.

The 2018 Indonesian Basic Health Survey population is all households in Indonesia. The survey uses the 2018 National Socio-Economic Survey sample framework, conducted in March 2018. Moreover, the survey visited the target sample of 300,000 households from 30,000 of the 2018 Socio-Economic Survey census blocks (run by the Central Statistics Agency).[22]

The survey uses the PPS (probability proportional to size) method using systematic linear sampling, with two-stage sampling: Stage 1: Implicit stratification of all census blocks resulting from the 2010 Population Census based on welfare strata. PPS selected the sample survey as the sampling frame for selecting census blocks from the master frame of 720,000 Census Blocks from the 2010 Population Census and 180,000 Census Blocks (25%). The survey determined several census blocks with the PPS method in each urban/rural strata per regency/city to produce a Census Block Sample List. The total number of selected Census Blocks is 30,000 Census Blocks. Stage 2: Selecting ten households in each Census Block updated by systematic sampling with the highest

implicit stratification of education completed by the Head of the Household to maintain the representation of the diversity value of household characteristics. Individuals sampled in the 2018 Indonesian Basic Health Survey be interviewed by all household members in the selected household. The weighting in the 2018 Indonesian Basic Health Survey refers to the 2018 National Socio-Economic Survey. The survey carried out weighting by the population frequency weight with the Generalized Least Square (GLS) method. Frequency weights are provided to provide numbers that reflect the actual population nationally. Finally, the survey collected data with a response rate of 93.20% for individual targets and 95.58% for household targets.[22]

This study's population was all adults (≥ 15 years) in Indonesia. The study analyzed 629,370 respondents as a weighted sample based on the sampling methods.

Outcome Variable

The outcome variable of the study was hospital utilization. Hospital utilization was an adult's access to outpatient or inpatient hospitals. Hospital utilization consists of two categories: unutilized and utilized. The study using outpatient hospitalizations was restricted to the previous month, whereas the survey determined inpatient hospitalizations in the past year. The poll requested this limit, so respondents correctly recollect outpatient and inpatient incidents.[22]

Exposure Variable

The study employed the region as an exposure variable. The study classified the region into seven categories: Sumatera, Java-Bali, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua. The study categorized the region according to the largest island in the area.[11,23]

Control Variables

The study used nine elements as control variables as part of those variables. The nine criteria were the type of residence, age group, gender, marital status, education level, occupation type, wealth status, health insurance ownership, and travel time to the hospital.

The study classified the type of residence into urban and rural categories. Furthermore, the study used the Indonesian Central Statistics Agency's provisions for urban-rural categorization in the survey. The study determined the age based on the last birthday that the respondent passed. The age group consists of three kinds: ≤ 17, 18-64, and ≥ 65. Gender, on the other hand, was divided into two categories: male and female. The marital status consists of three groups: never in a union, married/living with a partner, and divorced/widowed.

Education is their acknowledgment of their most recent diploma. The education level consists of four levels: no education, primary, secondary, and higher education. On the other hand, the study classified the occupation into six types: no work, civil servant/army/police, private sector, entrepreneur, farmer/fisherman/labor, and others.

The 2018 Indonesian Basic Health Survey used the wealth index formula to identify wealth status. The survey calculated the wealth index using a weighted average of a household's total spending. Meanwhile, the poll computed the wealth index using primary household expenditures such as health insurance, food, and lodging, among other things. Moreover, the survey divided the wealth index into five categories: the poorest, poorer, middle, richer, and richest.[24] Furthermore, the study classified health insurance ownership into four groups: uninsured, government-run insurance, private-run insurance, and government-run and private-run insurance. Moreover, travel time consists of ≤ 1 hour and > 1 hour.

Data Analysis

The study used the Chi-Square test to analyze a bivariate comparison in the first step. Meanwhile, the study utilized a collinearity test to ensure that the independent variables did not have a strong connection in the final regression model. Moreover, the study used a binary logistic regression. The last test was used to analyze the multivariate relationship between all independent variables and hospital utilization—the study employed IBM SPSS 26 throughout the statistical analysis phase of the investigation.

In contrast, the study used ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to map hospital utilization in Indonesia in 2018. The Indonesian Bureau of Statistics submitted a shapefile of administrative border polygons for analysis.

Patient and public involvement

No patient involvement

Ethical Approval

The National Ethics Committee granted Ethical Clearance to the 2018 Indonesian Basic Health Survey (LB.02.01/2/KE.024/2018). The survey removed the names of all respondents from the database due to the study.

Results

The analysis found that Indonesia's national average hospital utilization in 2018 in this study was 5.5%. Moreover, Figure 1 informs the region distribution map of hospital utilization by the province in Indonesia in 2018. Figure 1 shows diverse variations among areas in the scope of hospital utilization in every region. Except in the Nusa Tenggara and Maluku regions, the figure shows the same low coverage of hospital utilization among provinces.

Table 1 shows descriptive statistics of regions and the respondents' characteristics. Based on hospital utilization, those in the Sulawesi region have the highest hospital utilization than those in the other areas. Regarding the residence type, those who live in rural dominate all parts, except in the Java-Bali region, which is dominated live in urban areas. Based on the age group, the Papua region has the 18-64 groups, which are the largest compared to the other areas.

Meanwhile, according to gender, males ruled in Sumatra, Kalimantan, Maluku, and Papua regions. In contrast, females led in Java-Bali, Nusa Tenggara, and the Sulawesi region. Based on marital status and education level, those who married or lived with a partner and primary education occupied all areas.

On the other hand, based on occupation type, those who did not work ruled all regions except the Nusa Tenggara and Papua regions. The richest led in Java-Bali, Kalimantan, and Papua regions according to wealth status. Meanwhile, the poorest led in Nusa Tenggara and Sulawesi region. Besides, regarding health insurance ownership, government-run insurance dominated in all-region. Moreover, based on travel time to the hospital, the ≤ 1 hour travel time ruled in all-region.

The following analysis was the collinearity test. The collinearity test indicates no strong association between the independent variables. All variables' tolerance value is more significant than 0.10. On the other hand, all factors' variance inflation factor (VIF) value is less than 10.00. The results then concluded that the regression model exhibited no signs of multicollinearity.

Table 1. Descriptive statistics of regions and the respondents' characteristics (n=629,370)

Characteristics	Region							p-value
	Sumatera (n=188,111)	Java-Bali (n=227,337)	Nusa Tenggara (n=38,145)	Kalimantan (n=61,598)	Sulawesi (n=81,675)	Maluku (n=14,625)	Papua (n=17,879)	
Hospital utilization								< 0.001
Unutilized	94.9%	94.3%	95.7%	95.0%	94.1%	96.5%	95.1%	
Utilized	5.1%	5.7%	4.3%	5.0%	5.9%	3.5%	4.9%	
Residence type								
Urban	42.8%	64.5%	35.8%	46.9%	39.4%	38.3%	31.7%	
Rural	57.2%	35.5%	64.2%	53.1%	60.6%	61.7%	68.3%	
Age (mean)								< 0.001
≤ 17 years	7.9%	6.7%	9.0%	7.5%	8.1%	9.5%	6.4%	
18-64 years	85.7%	84.3%	83.5%	87.0%	84.2%	84.5%	91.1%	
≥ 65 years	6.4%	9.0%	7.5%	5.5%	7.8%	6.0%	2.5%	
Gender								
Male	50.3%	49.6%	48.0%	51.5%	49.2%	50.2%	52.6%	
Female	49.7%	50.4%	52.0%	48.5%	50.8%	49.8%	47.4%	
Marital status								< 0.001
Never in union	25.0%	21.9%	25.3%	23.4%	25.2%	26.2%	19.7%	
Married/Living with a partner	67.9%	69.2%	66.6%	69.4%	66.4%	66.7%	74.5%	
Divorced/Widowed	7.1%	9.0%	8.0%	7.3%	8.4%	7.1%	5.8%	
Education level								< 0.001
No education	3.6%	6.0%	10.1%	5.2%	5.7%	2.8%	17.7%	
Primary	55.8%	58.6%	57.5%	59.2%	57.0%	52.5%	47.1%	
Secondary	31.9%	27.5%	23.4%	27.0%	27.3%	33.9%	25.9%	
Higher	8.6%	7.9%	9.0%	8.5%	10.1%	10.7%	9.2%	
Occupation								< 0.001
No work	37.5%	37.5%	34.9%	35.6%	41.3%	37.8%	32.0%	
Civil servant/army/police	3.5%	2.2%	3.8%	4.3%	4.1%	6.9%	6.6%	
Private sector	6.1%	12.5%	5.4%	11.9%	5.1%	3.6%	5.8%	
Entrepreneur	14.4%	15.3%	9.2%	13.8%	10.8%	7.6%	10.1%	
Farmer/fisherman/labor	32.7%	27.7%	39.4%	27.5%	29.2%	33.4%	41.4%	
Others	5.8%	4.7%	7.3%	6.9%	9.4%	10.5%	4.1%	

Characteristics	Region							p-value
	Sumatera (n=188,111)	Java-Bali (n=227,337)	Nusa Tenggara (n=38,145)	Kalimantan (n=61,598)	Sulawesi (n=81,675)	Maluku (n=14,625)	Papua (n=17,879)	
Wealth status								< 0.001
Poorest	12.4%	18.1%	31.9%	7.0%	24.8%	16.4%	22.3%	
Poorer	19.8%	18.4%	21.1%	15.9%	17.6%	19.2%	11.2%	
Middle	22.4%	18.2%	18.4%	22.4%	18.2%	23.3%	12.8%	
Richer	23.8%	19.6%	14.9%	24.8%	18.7%	22.5%	19.4%	
Richest	21.7%	25.7%	13.6%	29.8%	20.7%	18.6%	34.4%	
Health Insurance								< 0.001
Uninsured	32.9%	32.9%	35.5%	37.6%	27.2%	38.6%	16.1%	
Government-run insurance	63.5%	62.1%	63.6%	57.4%	70.9%	60.8%	82.3%	
Private-run insurance	2.8%	3.8%	0.6%	3.9%	1.5%	0.4%	1.0%	
Government-run and Private-run insurance	0.8%	1.3%	0.3%	1.1%	0.4%	0.1%	0.6%	
Travel time								
≤ 1 hour	75.1%	87.5%	68.7%	68.2%	75.1%	60.4%	53.4%	
> 1 hour	24.9%	12.5%	31.3%	31.8%	24.9%	39.6%	46.6%	

Table 2 informs the binary logistic regression result of hospital utilization in Indonesia in 2018. The study employed "unutilized hospital" as a reference in this stage.

Table 2. The result of binary logistic regression of hospital utilization in Indonesia in 2018 (n=629,370)

Predictor	Hospital Utilization			
	p-value	AOR	95% CI	
			Lower Bound	Upper Bound
Region: Sumatera	**< 0.001	1.079	1.073	1.085
Region: Java-Bali	**< 0.001	1.075	1.069	1.081
Region: Nusa Tenggara	**< 0.001	1.106	1.099	1.113
Region: Sulawesi	*0.009	1.008	1.002	1.014
Region: Kalimantan	**< 0.001	1.212	1.205	1.219
Region: Maluku	**< 0.001	0.827	0.820	0.835
Region: Papua	-	-	-	-
Residence: Urban	**< 0.001	1.135	1.133	1.137
Residence: Rural	-	-	-	-
Age: ≤ 17 years	-	-	-	-
Age: 18-64 years	**< 0.001	1.387	1.381	1.392
Age: ≥ 65 years	**< 0.001	3.072	3.059	3.086
Gender: Male	-	-	-	-
Gender: Female	**< 0.001	1.200	1.198	1.201
Marital: Never in union	-	-	-	-
Marital: Married/Living with partner	**< 0.001	2.339	2.334	2.345
Marital: Divorced/Widowed	**< 0.001	1.948	1.942	1.954
Education: No Education	-	-	-	-
Education: Primary	**< 0.001	1.161	1.157	1.164
Education: Secondary	**< 0.001	1.111	1.108	1.115
Education: Higher	**< 0.001	1.190	1.186	1.194
Occupation: no work	-	-	-	-
Occupation: civil servant/army/police	**< 0.001	0.683	0.681	0.685
Occupation: private sector	**< 0.001	0.580	0.579	0.582
Occupation: entrepreneur	**< 0.001	0.658	0.657	0.660
Occupation: farmer/fisherman/labor	**< 0.001	0.573	0.571	0.574
Occupation: others	**< 0.001	0.837	0.835	0.839
Wealth: Poorest	-	-	-	-
Wealth: Poorer	**< 0.001	1.247	1.244	1.251
Wealth: Middle	**< 0.001	1.520	1.516	1.523
Wealth: Richer	**< 0.001	1.856	1.852	1.861
Wealth: Richest	**< 0.001	2.534	2.528	2.540
Insurance: Uninsured	-	-	-	-
Insurance: Government-run	**< 0.001	2.940	2.934	2.945
Insurance: Private-run	**< 0.001	2.928	2.918	2.938
Insurance: Government-run & Private-run	**< 0.001	5.096	5.073	5.119
Travel time: ≤ 1 hour	**< 0.001	1.475	1.471	1.478
Travel time: > 1 hour	-	-	-	-

Note: *p < 0.010; **p < 0.001; AOR: Adjusted Odds Ratio; CI: confidence interval.

Table 2 shows the disparity between regions in hospital utilization in Indonesia in 2018. Someone in the Sumatra region is 1.079 times more likely than someone in the Papua region to utilize the hospital (AOR 1.079; 95% CI 1.073-1.085). Someone in the Java-Bali region has 1.075 times the likely than someone in the Papua region to use the hospital (AOR 1.075; 95% CI 1.069-1.081). Someone in the Nusa Tenggara region is 1.106 times more likely than someone in the Papua region to utilize the hospital (AOR 1.106; 95% CI 1.099-1.113). Someone in the Sulawesi region is 1.008 times more likely than someone in the Papua region to utilize the hospital (AOR 1.008; 95% CI 1.002-1.014). Meanwhile, someone in the Kalimantan region is 1.212 times more likely than someone in the Papua region to use the hospital (AOR 1.212; 95% CI 1.205-1.219). Moreover, someone in the Maluku region is 0.827 times less likely than someone in the Papua region to make a hospital utilization (AOR 0.827; 95% CI 0.820-0.835). Sequentially, hospital utilization prevalence started from the lowest in Maluku, Papua, Sulawesi, Java-Bali, Sumatra, Nusa Tenggara, and Kalimantan regions.

Table 2 also informs six demographic variables related to hospital utilization in Indonesia. The six variables are age, gender, marital status, education level, occupation type, and wealth status. The older you are, the higher your chances of utilizing the hospital are based on age. Furthermore, regarding gender, females have a higher probability than males of using the hospital. On the other hand, the study found that all control variables were significantly related to hospital utilization in Indonesia. Someone living in an urban area is 1.135 times more likely than someone living in a rural area to utilize the hospital (AOR 1.135; 95% CI 1.133-1.137).

According to marital status, all marital status has a better chance of using the hospital than someone never in a union. Based on education level, all education level has a higher probability of utilizing the hospital than no education. Regarding occupation type, all occupations have a better chance of using the hospital than no work. Moreover, based on wealth status, Table 2 indicates that the richer a person is, the higher the probability of utilizing the hospital.

Based on health insurance ownership, someone with government-run insurance is 2.940 times more likely to use the hospital than the uninsured (AOR 2.940; 95% CI 2.934-2.945). Someone with private-run insurance has 2.928 times more likely than the uninsured to utilize the hospital (AOR 2.928; 95% CI 2.918-2.938). Furthermore, someone with government-run and private-run insurance is 5.096 times more likely than the uninsured to use the hospital (AOR 5.096; 95% CI 5.073-5.119).

According to travel time to the hospital, someone with ≤ 1-hour travel time is 1.475 times more likely than someone with > 1-hour travel time to utilize the hospital (AOR 1.475; 95% CI 1.471-1.478). The result indicates that shorter travel time increases the possibility of using the hospital.

Discussion

The study result shows that the disparity between regions in hospital utilization still exists in Indonesia in 2018. Geographical differences in access to health services are undeniable. As is known, Indonesia is a country consisting of islands with different geographical conditions. The unequal population concentration between regions exacerbates the situation; it has implications for developing health service facilities, including unevenly distributed hospitals.[11] Many hospitals or health facilities are built in densely populated areas for economic reasons. So it is not surprising that the distance is close to each other. Indirectly this makes it easier for people to take advantage of it.[25]

Meanwhile, in sparsely populated areas, such as Papua, the construction of hospitals is minimal, and people must travel tens of kilometers to take advantage of it. Conditions are more difficult when the terrain is hills and mountains.[14,15] In the United States, racial and ethnic minority populations experience health and healthcare differences that arise from interacting factors, including racism and discrimination, social factors, access and quality of health care, individual behavior, and biology.[26] It is necessary to understand the health system's culture, behavior, and elements that contribute to these disparities.[27]

The study found that someone living in an urban area is more likely to utilize the hospital than someone living in a rural area. This finding aligns with the research results on women in Sub-Saharan African countries accessing health services. This study indicates that women living in urban areas are 1.25 times more likely to use health services than women in rural areas.[28] The situation is also the case with the research results in China. Research on older adults shows that older people in rural areas have less access to health services than more seniors in urban areas.[29] The results of other studies also show similar results. People living in urban areas are more likely to get health care, undergo outpatient care, or be hospitalized than those in rural areas.[30] It is undeniable that there are differences between urban and rural areas regarding the availability of healthcare facilities. In urban areas, health service facilities are relatively adequate. Meanwhile, these facilities are very limited in rural areas and not infrequently, even non-existent. The lack or absence of these health service facilities causes people in rural areas not to use health services more minor.[31]

The results inform that the older you are, the higher your chances of utilizing the hospital are based on age. Furthermore, regarding gender, females have a higher probability than males of using the hospital. The older a person gets, the more likely that person is to suffer from degenerative diseases such as hypertension, heart failure, stroke, diabetes mellitus, kidney failure, and other chronic diseases such as cancer, stroke, etc. So it is not surprising that the older you get, the more likely you will use healthcare facilities for outpatient and inpatient care.[32,33] In contrast to the results of this study, research on the use of outpatient services in first-level health facilities and advanced health facilities shows that it is used more by men than women.[34]

All marital status has a better chance of using the hospital than someone never in a union. In addition, all education levels are more likely to utilize the hospital than no education. A person who lives without a partner is less likely to have a companion when going to a health facility than people who have a partner or married people. So it is unsurprising that access to health facilities is much lower than for people with a partner. Research specifically on women in Tanzania states that apart from poverty, unemployment, and increasing age, those who do not have a partner will have more problems accessing health services than those with a partner.[35,36] In addition, the higher a person's level of education, the better the level of knowledge, including knowledge of health. The results of previous studies indicate that a good level of health knowledge is associated with increased visits to healthcare facilities, health checks, and a person's health status.[37] Moreover, previous studies have found that education is a strong determinant of various outputs in the health sector.[38–40]

All occupations have a better chance of using the hospital than no work. Moreover, the wealthier a person is, the higher the probability of utilizing the hospital. Generally, the rewards/wages for people who work are in the form of money, not goods (food, clothing, etc.). Working means that a person will have money that can be used to meet their daily needs, including paying for health services.[35,41] On the other hand, hospital care costs are relatively higher than services at primary health facilities, especially if you have to be hospitalized. The condition is undoubtedly an obstacle for people who do not work, have no income, or are poor, especially if they do not have health insurance.[42] People who work with better economic status have a high chance of taking advantage of the hospital.[43] So, it is not surprising that the richer

a person will have a more remarkable ability to access health services at the hospital than the poor.

Meanwhile, the study shows that health insurance can increase hospital utilization. The study results in the capital city of Iran, Tehran, show that one of the reasons people do not take advantage of health care facilities and choose to do a treatment at home. The condition is because they do not have sufficient funds or because the cost of health services is high.[44] Improved access to health care facilities for both outpatient and inpatient, including increased routine care for chronic conditions and improved quality of health care for low-income people, is associated with expanded coverage of health insurance programs.[45] In addition, the health financing scheme assistance provided by the government can increase the use of health services for the rural poor.[46] The results of previous studies indicate that barriers to access and financing are related to the use of health services; mothers who have health insurance and have a higher economic status have a more excellent opportunity to take advantage of health services.[47,48]

Based on time travel to the hospital, the 10 minutes time travel has more likely than the >10 minutes time travel to utilize the hospital. It is undeniable that distance significantly affects the utilization of health care facilities, and the close distance increases the possibility of accessing health care facilities if they experience health problems. On the other hand, long distances cause a person to be reluctant to access health services, especially if you don't have adequate transportation, no public transportation, and poor road conditions.[49] So, a disadvantage for people living in rural areas in accessing health care facilities is a longer travel time than people living in urban areas.[50] The study results confirm the results of previous studies that the close distance to the hospital increases repeats visits for inpatients.[51,52]

Strength and Limitation

The research examines big data to provide information on a national scale. On the other hand, because the study is based on secondary data, the variables evaluated are limited to acceptable ones. Other factors linked to hospital utilization that have been established in previous studies, such as supplier induce demand, the cost of travel to the hospital, and the kind of disease, cannot be investigated.[15,53–55]

Conclusion

Based on the results, the study concludes that regional disparities existed in hospital utilization in Indonesia. Sequentially, hospital utilization prevalence started from the lowest in Maluku, Papua, Sulawesi, Java-Bali, Sumatra, Nusa Tenggara, and Kalimantan regions.

Moreover, the study also found six demographic variables related to hospital utilization in Indonesia: age, gender, marital status, education level, occupation type, and wealth status. Including another three control variables: residence type, health insurance, and travel time to the hospital.

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Contributors ADL developed the proposal, analyzed the patient data, and interpreted it. RDW was a significant contributor in conducting the study, interpreting the data, and writing the manuscript. NR, RR, and TT contributed substantially to conducting the research and writing the manuscript. All authors read and approved the final manuscript.

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Ethics Approval The National Ethics Committee granted Ethical Clearance for the 2018 Indonesian Basic Health Survey (Number: LB.02.01/2/KE.024/2018). The survey deleted all the identities of respondents from the dataset. For their participation in the report, respondents have given written consent. The author has obtained permission to use data for this study through the website: https://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/.

Provenance and peer review Not commissioned; externally peer reviewed

Data availability statement The author cannot publicly share the data because a third party and the Ministry of Health of the Republic of Indonesia, who owns the data, do not have permission to share it. The 2018 Indonesian Basic Health Survey data set is available from the web http://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/ for researchers who meet the criteria for access to confidential data.

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References

1. Kemenkes R. Peraturan Menteri Kesehatan Republik Indonesia Nomor 001 Tahun 2012 tentang Sistem Rujukan Pelayanan Kesehatan Perorangan. Jakarta Indonesia; 2012. Report No.: Nomor 001.
2. the Minister of Health of the Republic of Indonesia. Regulation of the Minister of Health of the Republic of Indonesia Number 71 of 2013 concerning Health Services in the National Health Insurance. Jakarta, Indonesia: Kementerian Kesehatan Republik Indonesia; 2013 p. 28.
3. Nurlinawati I, Rosita R. Persepsi Peserta JKN Terhadap Penyelenggara Pelayanan Kesehatan Rujukan. J Penelit dan Pengemb Pelayanan Kesehat. 2018;2(1):38–46.
4. Ratnasari D. Analisis Pelaksanaan Sistem Rujukan Berjenjang Bagi Peserta JKN di Puskesmas X Kota Surabaya. J Adm Kesehat Indones. 2017;5(2):145–54.
5. The Ministry of Health of The Republic of Indonesia. Handbook of National Health Insurance for Key Populations (Buku Panduan Jaminan Kesehatan Nasional Bagi Populasi Kunci). Www.Jkn.Kemkes.Go.Id. Jakarta Indonesia; 2016. 3–4 p.
6. Direktorat Pelayanan Kesehatan. Rujukan. Laporan Akuntabilitas Kinerja Instansi Pemerintah. Jakarta Indonesia: Kementerian Kesehatan Republik Indonesia; 2020. 77 p.
7. Rukmini, Rosiehemiatie B, Nantabah Z. Ketersediaan Dan Kelayakan Ruangan Pelayanan Puskesmas Berdasarkan Topografi, Demografi Dan Geografi Di Indonesia.

Bul Penelit Sist Kesehat. 2012;15(4):408–17.
8. Megatsari H, Dwi Laksono A, Akhsanu Ridlo I, Yoto M, Nur Azizah A, Promosi Kesehatan dan Ilmu Perilaku D, et al. Perspektif Masyarakat Tentang Akses Pelayanan Kesehatan Community Perspective about Health Services Access. Bul Penelit Sist Kesehat. 2018;21(4):247–53.
9. Lestari PAP, Roesdiyanto R, Ulfah NH. Kebutuhan Kesehatan dan Akses Pelayanan Kesehatan dengan Kepesertaan Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan. J Penelit dan Pengemb Kesehat Masy Indones. 2020;1(2):138–56.
10. Maulany RF, Dianingati RS, Annisaa' E. Faktor-Faktor yang Mempengaruhi Akses Kesehatan. Indones J Pharm Nat Prod. 2021;4(2):142–9.
11. Mahmudiono T, Laksono AD. Disparity in the hospitals utilization among regions in Indonesia. Open Access Maced J Med Sci. 2021;9(E):1461–6.
12. Mulyanto J, Kunst AE, Kringos DS. Geographical inequalities in healthcare utilisation and the contribution of compositional factors: A multilevel analysis of 497 districts in Indonesia. Heal Place. 2019;60(October):102236.
13. Maryani H, Kristiana L, Paramita A, Izza N. Disparitas Pembangunan Kesehatan di Indonesia Berdasarkan Indikator Keluarga Sehat Menggunakan Analisis Cluster. Bul Penelit Sist Kesehat. 2020;23(1):18–27.
14. Wulandari RD, Laksono AD, Matahari R, Rohmah N, Krismawati H. Performance of Maternal and Child Health Services in Papua in 2018: Does the input of midwives and doctors have an effect? (Kinerja Pelayanan Kesehatan Ibu dan Anak di Papua Tahun 2018: Apakah input tenaga bidan dan dokter berpengaruh?). Bul Penelit Sist Kesehat. 2021;24(4):275–85.
15. Laksono AD, Wulandari RD. Predictors of hospital utilization among papuans in Indonesia. Indian J Forensic Med Toxicol. 2020;14(2):2319–24.
16. Laksono AD, Wulandari RD, Soedirham O. Urban and Rural Disparities in Hospital Utilization among Indonesian Adults. Iran J Public Health. 2019;48(2):247–55.
17. Kareth Y, Purnami CT, Sriatmi A. Evaluation on the Implementation of Maternal and Child Health Service Reporting by Coordinator Midwives at Primary Healthcare Centers in Nabire District, Papua Province. J Manaj Kesehat Indones. 2015;3(1):1–10.
18. Nurrizka RH, Wahyono TYM. Disparitas Kematian Maternal di Indonesia: Studi Ekologi dengan Analisis Spasial. Media Kesehat Masy Indones. 2018;14(2):119–27.
19. Kusworo DL, Nur M, Fauzi K, Pratama AA, Kusworo DL, Nur M, et al. Primary Health Care Improvement: Jaminan Pelayanan Kesehatan Di Daerah Terdampak Pada Masa Mitigasi Covid-19. Khatulistiwa Law Rev. 2021;2(2):329–47.
20. Wulandari RD, Laksono AD, Nantabah ZK, Rohmah N, Zuardin Z. Hospital utilization in Indonesia in 2018: do urban-rural disparities exist? BMC Health Serv Res. 2022;2022(22):491.
21. Putri RN. Perbandingan Sistem Kesehatan di Negara Berkembang dan Negara Maju. J Ilm Univ Batanghari Jambi. 2019;19(1):139.
22. National Institute of Health Research and Development of the Ministry of Health of the Republic of Indonesia. The 2018 Indonesian Basic Health Survey [Internet]. Jakarta; 2018 [cited 2021 Oct 7]. p. 99. Available from: http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf
23. Laksono AD, Wulandari RD, Soedirham O. Regional Disparities of Health Center Utilization in Rural Indonesia. Malaysian J Public Heal Med. 2019;19(1):158–66.
24. Wulandari RD, Qomarrudin MB, Supriyanto S, Laksono AD. Socioeconomic Disparities in Hospital Utilization among Elderly People in Indonesia. Indian J Public Heal Res Dev. 2019;10(11):1800–4.

25. Laksono AD, Wulandari RD. Regional disparities of facility-based childbirth in Indonesia. Trends Sci. 2021;18(21):387.
26. Serchen J, Doherty R, Atiq O, Hilden D. A Comprehensive Policy Framework to Understand and Address Disparities and Discrimination in Health and Health Care: A Policy Paper From the American College of Physicians. Ann Intern Med. 2021 Apr;174(4):529–32.
27. Wasserman J, Palmer RC, Gomez MM, Berzon R, Ibrahim SA, Ayanian JZ. Advancing Health Services Research to Eliminate Health Care Disparities. Am J Public Health. 2019;109(S1):S64–9.
28. Tessema ZT, Worku MG, Tesema GA, Alamneh TS, Teshale AB, Yeshaw Y, et al. Determinants of accessing healthcare in Sub-Saharan Africa: A mixed-effect analysis of recent Demographic and Health Surveys from 36 countries. BMJ Open. 2022;12(1):1–8.
29. Zhang X, Dupre ME, Qiu L, Zhou W, Zhao Y, Gu D. Urban-rural differences in the association between access to healthcare and health outcomes among older adults in China. BMC Geriatr. 2017;17(1):1–11.
30. Li J, Shi L, Liang H, Ding G, Xu L. Urban-rural disparities in health care utilization among Chinese adults from 1993 to 2011. BMC Health Serv Res. 2018;18(102):1–9.
31. Wulandari RD, Laksono AD, Rohmah N. Urban-rural disparities of antenatal care in South East Asia: a case study in the Philippines and Indonesia. BMC Public Health. 2021;21(1):1221.
32. Pratiwi NL, Rachmawaty T, Angkasawati TJ, Suharmiati S, Lestari H, Laksono AD. Dietary Pattern and Physical Activity Related to Hypertension in Indonesia. Indian J Forensic Med Toxicol. 2021;15(3):3802–10.
33. Ridwanah AA, Megatsari H, Laksono AD. Hypertension in Indonesia in 2018 : An Ecological Analysis. 2020;(December).
34. Valentina R, Pujianto. Factors Related to The Use of Outpatient. J Heal Sci. 2019;13(1):12–6.
35. Bintabara D, Nakamura K, Seino K. Improving access to healthcare for women in Tanzania by addressing socioeconomic determinants and health insurance: a population-based cross-sectional survey. BMJ Open. 2018;8(9):1–7.
36. Megatsari H, Laksono AD, Herwanto YT, Sarweni KP, Geno RAP, Nugraheni E, et al. Does husband/partner matter in reduce women's risk of worries?: Study of psychosocial burden of covid-19 in indonesia. Indian J Forensic Med Toxicol. 2021;15(1):1101–6.
37. Megatsari H, Laksono AD, Ridlo IA, Yoto M, Azizah AN. Community Perspective about Health Services Access. Bull Heal Syst Res. 2018;21:247–253.
38. Ipa M, Widawati M, Laksono AD, Kusrini I, Dhewantara PW. Variation of preventive practices and its association with malaria infection in eastern Indonesia: Findings from community-based survey. PLoS One. 2020;15(5):e0232909.
39. Wulandari RD, Laksono AD. Education as predictor of the knowledge of pregnancy danger signs in Rural Indonesia. Int J Innov Creat Chang. 2020;13(1):1037–51.
40. Putri NK, Laksono AD. Predictors of childbirth services in Indonesia. Int J Public Heal Sci. 2022;11(2):566–73.
41. Denny HM, Laksono AD, Matahari R, Kurniawan B. The Determinants of Four or More Antenatal Care Visits Among Working Women in Indonesia. Asia-Pacific J Public Heal. 2022;34(1):51–6.
42. Guo B, Xie X, Wu Q, Zhang X, Cheng H, Tao S, et al. Inequality in the health services utilization in rural and urban China: A horizontal inequality analysis. Med (United States). 2020;99(2):1–7.
43. Wulandari RD, Laksono AD, Prasetyo YB, Nandini N. Socioeconomic Disparities in

Hospital Utilization Among Female Workers in Indonesia: A Cross-Sectional Study. J Prim Care Community Health. 2022;I3(2):1–7.
44. Motlagh SN, Mahani AS, Barooni M, Lari MA, Mahdavi MRV, Hadian M. Determining factors related to health services utilization: case of Tehran Soraya. Razi J Med Sci. 2015;21(127):60–72.
45. Mao W, Tang Y, Tran T, Pender M, Khanh PN, Tang S. Advancing universal health coverage in China and Vietnam: lessons for other countries. BMC Public Health. 2020;20(1):1–9.
46. Laksono AD, Wulandari RD, Zuardin Z, Nopianto N. The disparities in health insurance ownership of hospital-based birth deliveries in eastern Indonesia. BMC Health Serv Res. 2021;21(1):1261.
47. Wulandari RD, Laksono AD, Matahari R. The Effects of Health Insurance on Maternity Care in Health Services in Indonesia. Int J Innov Creat Chang. 2020;14(2):478–97.
48. Andayani Q, Koesbardiati T, Prahastuti AD, Masruroh M, Laksono AD. The Barrier to Access Health Insurance for Maternity Care: Case Study of Female Workers in Indonesia. Medico-Legal Updat. 2021;21(2):926–32.
49. Varela C, Young S, Mkandawire N, Groen RS, Banza L, Viste A. Transportation Barriers to Access Health Care for Surgical Conditions in Malawi: a cross sectional nationwide household survey 11 Medical and Health Sciences 1117 Public Health and Health Services. BMC Public Health. 2019;19(1):Article number 264.
50. Yiengprugsawan VS, Dorj G, Dracakis JG, Batkhorol B, Lkhagvaa U, Battsengel D, et al. Disparities in outpatient and inpatient utilization by rural-urban areas among older Mongolians based on a modified WHO-SAGE instrument. BMC Health Serv Res. 2021;21(183):1–10.
51. Jumriati, Satrianegara MF, Habibi. Reutilization of Health Services by General Inpatients at Sheikh Yusuf Hospital in 2019. Higiene. 2020;6(1):1–7.
52. Laksono AD, Wulandari RD. Determinant of the Puskesmas Utilization in Madura Island. Indian J Public Heal Res Dev. 2019;10(11):576–81.
53. Laksono AD, Wulandari RD, Efendi F. Determinants of hospital utilisation among urban poor societies in Indonesia. Int J Innov Creat Chang. 2020;12(9):375–87.
54. Wei Y, Yu H, Geng J, Wu B, Guo Z, He L, et al. Hospital efficiency and utilization of high-technology medical equipment: A panel data analysis. Heal Policy Technol. 2018;7(1):65–72.
55. Dzampe AK, Takahashi S. Competition and physician-induced demand in a healthcare market with regulated price: evidence from Ghana. Int J Heal Econ Manag. 2021;22:295–313.

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

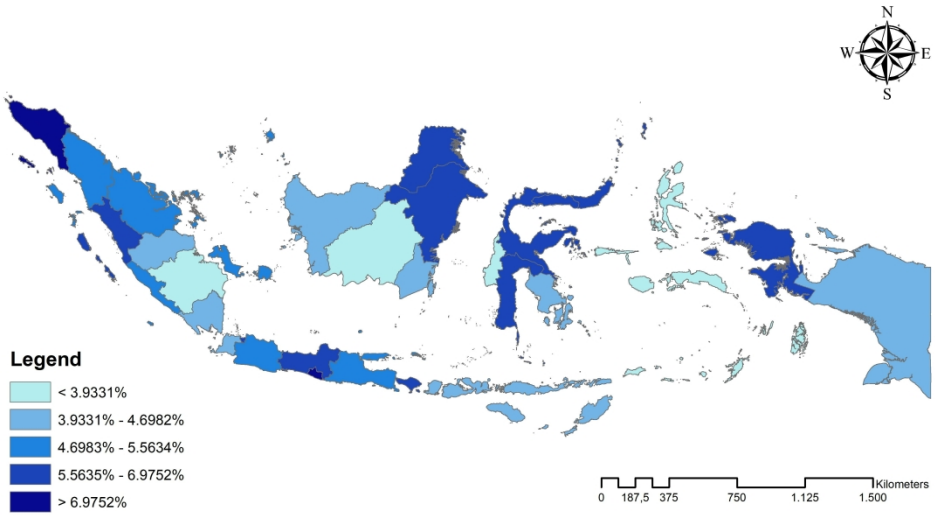

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

191x108mm (600 x 600 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	4-5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5-6
		(*b*) Describe any methods used to examine subgroups and interactions	5-6
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11

		(*b*) Report category boundaries when continuous variables were categorized	6-8
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
Discussion			
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.

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Regional disparities in hospital utilization in Indonesia: an analysis of cross-sectional data from the 2018 Indonesian Basic Health Survey

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Abstract

Objective Policymakers must ensure that the entire population has equal access to health services and efforts to minimize inequalities are needed. This study aimed to analyze regional disparities in hospital utilization in Indonesia.

Design A cross-sectional study analysing secondary data from the 2018 Indonesian Basic Health Survey.

Setting National-level survey data from Indonesia.

Participants A total of 629,370 participants were included in this study.

Methods Respondents in the sample were recruited via stratified multistage random sampling. Binary logistic regression was employed in the analysis. Aside from region and hospital utilization, residence type, age, gender, marital status, educational level, occupation, wealth, insurance, and travel time were used as control variables.

Results The respondents in Sumatra were 1.079 times (95% confidence interval (CI) 1.073–1.085) more likely than those in Papua to utilize the hospital. Furthermore, compared with the respondents in Papua, those in the Java–Bali region (1.075 times, 95% CI 1.069–1.081), Nusa Tenggara (1.106 times, 95% CI 1.099–1.113), Sulawesi (1.008 times, 95% CI 1.002–1.014), and Kalimantan (1.212 times, 95% CI 1.205–1.219) were more likely to utilize the hospital. However, those in Maluku were less likely than those in Papua to utilize the hospital (0.827, 95% CI 0.820–0.835). Six demographic variables (age, gender, marital status, educational level, occupation, and wealth) and three other control variables (residence type, insurance, and travel time to the hospital) were found to be associated with hospital utilization.

Conclusion Our findings highlight the existence of regional disparities in hospital utilization in Indonesia.

Keywords: health disparity, hospital utilization, healthcare evaluation, healthcare access, public health.

Strengths and limitations of this study

- This cross-sectional study used secondary data obtained from the 2018 Indonesian Basic Health Survey, analysing a large amount of national-level data.
- The research employed a weighted sample of 629,370 participants.
- The survey used household and individual instrument interviews to collect data.
- Limitations include the use of secondary data, which limits the variables that could be investigated (eg, other factors previously shown to be associated with hospital utilization, such as travel cost, lifestyle, and disease type, could not be included in the analysis).

Introduction

The health service referral system implements health services that regulate the delegation of duties and responsibilities of reciprocal health services vertically and horizontally. Health service providers must refer patients when disease conditions or health problems require it.[1] Such providers include all first- and advanced-level referral health facilities that work alongside the Social Security Administrator for Health.[2] The study results indicated that the public has good perception of health services and that information regarding the referral flow is clearly conveyed. The referral request and referral process from public health care are straightforward. Patients get direct referrals for several visits to the hospital; thus, they do not need to frequently return to public health care.[3] Implementation of the referral system in public health care involves requirements for referring patients and clinical and administrative referral procedures to regulations and existing guidelines.[4] Referral services are among the types of complete healthcare efforts.

In Indonesia, regulation of the healthcare system indicates that everyone has equal access to healthcare resources and safe, quality, and affordable health services. To prevent patients from bearing the burden of healthcare costs, a health insurance is needed. Thus, the health financing is borne jointly by all participants so that it is not burdensome for each of them.[5] Health insurance ensures health protection so that participants receive healthcare benefits and safety in meeting primary health needs to be given to everyone—people who have paid dues or whose contributions are paid by the government. Individual health service efforts are organized in health facilities.[2] A referral system is implemented when patients experience health problems that cannot be managed by first-level health facilities. Based on the 2020 performance accountability report of government agencies, the performance rate of referral and vertical hospitals with services meeting the standards is 59% (out of the 70% target).[6]

Indonesia is a country with an archipelagic topography. The study results regarding the health services in Indonesia indicated a correlation between the feasibility of the service room and topography, demography, and geography. More service rooms are located in central/common than remote areas, in nonborder than border areas, in nonarchipelagic than archipelagic areas, in areas with a population of 30,000 than other sites with a population of 30,000, and in urban than rural areas.[7] In general, the community believes that there are still perceived deficiencies regarding the accessibility of health services, especially in terms of physical access, due to poor facilities and infrastructure. Social access also seems to be lacking due to the less-friendly manner displayed by health workers.[8] Other studies support that access to health services is related to Social Security Administrator membership,[9] whereas the residence location affects access to health services.[10]

Previous studies have demonstrated that disparities exist between regions in Indonesia in terms of hospital utilization. Such disparities are related to a complex factor of individual characteristics through geographical barriers.[11] In Indonesia, there is a wide variation in districts in terms of health service utilization. Cities have a higher level of utilization than rural areas [12]. In Indonesia, there are still disparities in health development, especially in terms of the healthy family indicator. The provinces in Eastern Indonesia with low-level healthy family indicators are Maluku, North Maluku, West Papua, and Papua (cluster 4). Those with high-level healthy family indicators (cluster 3) are the Riau Islands, Jakarta, Yogyakarta, Bali, East Kalimantan, North Kalimantan, South Sulawesi, and Gorontalo.[13] The study on maternal and child health in Papua demonstrated that the input range for midwives and doctors in Papua is extensive, and there is a very high variation between districts/cities in terms of the input variable and performance.[14]

Differences in urban–rural areas, travel time to the hospital, and transportation costs predict hospital utilization for outpatients in Papua.[15,16] The delay in the reporting of the performance of maternal and child health in Papua was caused by the difficult geographical access as well as heavy workloads.[17] Furthermore, a previous study demonstrated that the disparity in maternal mortality was caused by the medium factor gap between regencies/cities in Indonesia, with the risk of maternal mortality included.[18] Some areas still have limited access to essential health services in public health care. These obstacles can be seen from the minimal number of public health care and the gap in facilities between regions, lack of various supporting factors, and limited quantity of health workers that affects public health outcomes.[19]

Policymakers must ensure equitable health services. The government must have the policy to reduce disparities in health services in Indonesia.[20] The existing policy is the National Health Insurance System, which is used by the government as a reference for primary health care.[21] Furthermore, social health insurance or national health insurance ensures that the community has access to health services. Social health insurance provides comprehensive benefits at affordable premiums. It also applies the principles of cost and quality control. This means that participants can get adequate quality services at reasonable and controlled prices.[5] The government needs to establish a strategy to overcome the dynamics of health as an improvement in the policy framework to realize the sustainable development goal targets in the health service sector in the regions. There needs to be a guarantee of certainty through Primary Healthcare Improvement to improve the region's public healthcare services.[19] Based on the background narrative, the study aimed to analyze Indonesia's regional disparities in hospital utilization.

Methods

Study design and data source

The study used secondary data obtained from the 2018 Indonesian Basic Health Survey. The survey was a national scale cross-sectional poll by the Republic of Indonesia's Ministry of Health. The survey was conducted from May to July 2018, and information was collected through interviews with households and individuals.

The 2018 Indonesian Basic Health Survey population sampling frame is all households in Indonesia. The survey used the sample framework of the 2018 National Socioeconomic Survey, which was conducted in March 2018. Moreover, the survey visited the target sample of 300,000 households from 30,000 of the 2018 Socioeconomic Survey census blocks (run by the Central Statistics Agency).[22]

The survey employed the PPS (probability proportional to size) method and systematic linear sampling, with two-stage sampling. Stage 1 involves implicit stratification of all census blocks resulting from the 2010 Population Census based on welfare strata. PPS selected the sample survey as the sampling frame for selecting census blocks from the master frame of 720,000 Census Blocks from the 2010 Population Census and 180,000 Census Blocks (25%). The survey determined several census blocks using the PPS method in each urban/rural strata per regency/city to produce a census block sample list. The total number of selected census blocks was 30,000. On the other hand, stage 2 involves selecting 10,000 households in each census block updated *via* systematic sampling with the highest implicit stratification of educational level completed by the head of the household to maintain the representation of the diversity value of household characteristics. Individuals sampled in the 2018 Indonesian Basic Health Survey were interviewed by all household members in the selected household. The weighting in the 2018

Indonesian Basic Health Survey refers to the 2018 National Socioeconomic Survey. The survey carried out weighting by the population frequency weight with the Generalized Least Square method. The study used frequency weights to generate values that accurately reflect the national population. Finally, the survey collected data with a response rate of 93.20% for individual targets and 95.58% for household targets.[22]

The study included all adults (≥15 years old) in Indonesia. A total of 629,370 respondents were analyzed as a weighted sample using the sampling methods.

Outcome variable

The outcome variable of the study was hospital utilization, which refers to an adult's access to outpatient or inpatient hospitals. The types of hospital utilization were unutilized and utilized. The study using outpatient hospitalization was restricted to the previous month, whereas the survey determined inpatient hospitalizations in the past year. This limit was requested by the poll, so respondents correctly recollect outpatient and inpatient incidents.[22]

Exposure variable

The study used region as an exposure variable and classified it into seven categories according to the largest island in the area: Sumatra, Java–Bali, Nusa Tenggara, Kalimantan, Sulawesi, Maluku, and Papua.[11,23]

Control variables

This study used residence type, age group, gender, marital status, educational level, occupation, wealth status, health insurance, and travel time to the hospital as control variables.

The study categorized the residence type into urban and rural. Furthermore, it used the Indonesian Central Statistics Agency's provisions for urban–rural categorization in the survey. The study determined the age based on the last birthday of the respondent. The age group were ≤17, 18–64, and ≥65 years. On the other hand, gender was categorized into male and female and marital status into never in a union, married/living with a partner, and divorced/widowed.

The respondents' educational level was based on their acknowledgment of their most recent diploma. The educational level was categorized into no education and primary, secondary, and higher education. Furthermore, occupation was categorized into no work, civil servant/army/police, private sector, entrepreneur, farmer/fisherman/labor, and others.

The 2018 Indonesian Basic Health Survey used the wealth index formula to determine the respondents' wealth status. The survey calculated the wealth index using a weighted average of a household's total spending. Meanwhile, the poll computed the wealth index using primary household expenditures, such as health insurance, food, and lodging, among other things. Moreover, the wealth index was divided into five categories: poorest, poorer, middle, richer, and richest.[24] The health insurance type was categorized into uninsured, government-run insurance, private-run insurance, and government- and private-run insurance. Moreover, the travel times were ≤1 h and >1 h.

Data analysis

The chi-squared test was employed to analyze a bivariate comparison in the first step. Meanwhile, a collinearity test was used to ensure that the independent variables did not have a strong connection in the final regression model. Moreover, the study employed binary logistic regression. The last test was used to analyze the multivariate relationship between all

independent variables and hospital utilization—the study used IBM SPSS 26 in all the statistical analyses of the investigation.

Contrarily, the study used ArcGIS 10.3 (ESRI Inc., Redlands, CA, USA) to map hospital utilization in Indonesia in 2018. The Indonesian Bureau of Statistics submitted a shapefile of administrative border polygons for analysis.

Ethical approval

The National Ethics Committee granted Ethical Clearance to the 2018 Indonesian Basic Health Survey (LB.02.01/2/KE.024/2018). The survey removed the names of all respondents from the database. No ethics approval was required for the present secondary analysis; the authors have obtained permission to use data for this analysis.

Patient and public involvement

None.

Results

The analysis revealed that Indonesia's national average of hospital utilization in 2018 was 5.5%. Figure 1 presents the 2018 region distribution map of hospital utilization by the province in Indonesia. It also shows the diverse variations among areas in the scope of hospital utilization in every region. Except in Nusa Tenggara and Maluku, the figure presents the same low coverage of hospital utilization among provinces.

Table 1 presents the descriptive statistics of the regions and the respondents' characteristics. Regarding hospital utilization, the respondents in Sulawesi had the highest hospital utilization than those in other areas. For the residence type, those who live in rural dominate all parts, except in the Java–Bali region, which is dominated live in urban areas. For age group, Papua had the highest number of respondents aged 18–64 years compared with the other areas.

Meanwhile, regarding gender, males dominated Sumatra, Kalimantan, Maluku, and Papua. Contrarily, females dominated Java–Bali, Nusa Tenggara, and Sulawesi. Based on marital status and educational level, those who were married or lived with a partner and had primary education occupied all areas.

On the other hand, regarding occupation, those who were not working dominated all regions, except Nusa Tenggara and Papua. As for the wealth status, the richest respondents dominated Java–Bali, Kalimantan, and Papua. Meanwhile, the poorest respondents were mostly found in Nusa Tenggara and Sulawesi. Furthermore, regarding health insurance, government-run insurance dominated all regions, whereas regarding travel time to the hospital, the ≤1-h travel time was mostly observed in all regions.

The collinearity test was used for the analysis. This test indicated no strong association between the independent variables. The tolerance value of all variables was more significant than 0.10. On the other hand, the variance inflation factor value of all factors was less than 10.00. The results indicated that the regression model exhibited no signs of multicollinearity.

Table 2 presents the binary logistic regression result of hospital utilization in Indonesia in 2018. The study used "unutilized hospital" as a reference in this stage.

Table 1. Descriptive statistics of the regions and the respondents' characteristics (n = 629,370)

Characteristics	Region							*P*-value
	Sumatra (n = 188,111)	Java–Bali (n = 227,337)	Nusa Tenggara (n = 38,145)	Kalimantan (n = 61,598)	Sulawesi (n = 81,675)	Maluku (n = 14,625)	Papua (n = 17,879)	
Hospital utilization								<0.001
Unutilized	94.9%	94.3%	95.7%	95.0%	94.1%	96.5%	95.1%	
Utilized	5.1%	5.7%	4.3%	5.0%	5.9%	3.5%	4.9%	
Residence type								
Urban	42.8%	64.5%	35.8%	46.9%	39.4%	38.3%	31.7%	
Rural	57.2%	35.5%	64.2%	53.1%	60.6%	61.7%	68.3%	
Age (mean)								<0.001
≤17 years	7.9%	6.7%	9.0%	7.5%	8.1%	9.5%	6.4%	
18–64 years	85.7%	84.3%	83.5%	87.0%	84.2%	84.5%	91.1%	
≥65 years	6.4%	9.0%	7.5%	5.5%	7.8%	6.0%	2.5%	
Gender								
Male	50.3%	49.6%	48.0%	51.5%	49.2%	50.2%	52.6%	
Female	49.7%	50.4%	52.0%	48.5%	50.8%	49.8%	47.4%	
Marital status								<0.001
Never in union	25.0%	21.9%	25.3%	23.4%	25.2%	26.2%	19.7%	
Married/living with a partner	67.9%	69.2%	66.6%	69.4%	66.4%	66.7%	74.5%	
Divorced/widowed	7.1%	9.0%	8.0%	7.3%	8.4%	7.1%	5.8%	
Educational level								<0.001
No education	3.6%	6.0%	10.1%	5.2%	5.7%	2.8%	17.7%	
Primary	55.8%	58.6%	57.5%	59.2%	57.0%	52.5%	47.1%	
Secondary	31.9%	27.5%	23.4%	27.0%	27.3%	33.9%	25.9%	
Higher	8.6%	7.9%	9.0%	8.5%	10.1%	10.7%	9.2%	
Occupation								<0.001
No work	37.5%	37.5%	34.9%	35.6%	41.3%	37.8%	32.0%	
Civil servant/army/police	3.5%	2.2%	3.8%	4.3%	4.1%	6.9%	6.6%	
Private sector	6.1%	12.5%	5.4%	11.9%	5.1%	3.6%	5.8%	
Entrepreneur	14.4%	15.3%	9.2%	13.8%	10.8%	7.6%	10.1%	
Farmer/fisherman/labor	32.7%	27.7%	39.4%	27.5%	29.2%	33.4%	41.4%	
Others	5.8%	4.7%	7.3%	6.9%	9.4%	10.5%	4.1%	

Characteristics	Region							*P*-value
	Sumatra (n = 188,111)	Java–Bali (n = 227,337)	Nusa Tenggara (n = 38,145)	Kalimantan (n = 61,598)	Sulawesi (n = 81,675)	Maluku (n = 14,625)	Papua (n = 17,879)	
Wealth status								<0.001
Poorest	12.4%	18.1%	31.9%	7.0%	24.8%	16.4%	22.3%	
Poorer	19.8%	18.4%	21.1%	15.9%	17.6%	19.2%	11.2%	
Middle	22.4%	18.2%	18.4%	22.4%	18.2%	23.3%	12.8%	
Richer	23.8%	19.6%	14.9%	24.8%	18.7%	22.5%	19.4%	
Richest	21.7%	25.7%	13.6%	29.8%	20.7%	18.6%	34.4%	
Health insurance								<0.001
Uninsured	32.9%	32.9%	35.5%	37.6%	27.2%	38.6%	16.1%	
Government-run insurance	63.5%	62.1%	63.6%	57.4%	70.9%	60.8%	82.3%	
Private-run insurance	2.8%	3.8%	0.6%	3.9%	1.5%	0.4%	1.0%	
Government- and private-run insurance	0.8%	1.3%	0.3%	1.1%	0.4%	0.1%	0.6%	
Travel time								
≤1 h	75.1%	87.5%	68.7%	68.2%	75.1%	60.4%	53.4%	
>1 h	24.9%	12.5%	31.3%	31.8%	24.9%	39.6%	46.6%	

Table 2. Result of the binary logistic regression of hospital utilization in Indonesia in 2018 (n = 629,370)

Predictor	Hospital utilization			
	AOR	95% CI		*P*-value
		Lower bound	Upper bound	
Region				
Sumatra	1.079	1.073	1.085	**<0.001
Java–Bali	1.075	1.069	1.081	**<0.001
Nusa Tenggara	1.106	1.099	1.113	**<0.001
Sulawesi	1.008	1.002	1.014	*0.009
Kalimantan	1.212	1.205	1.219	**<0.001
Maluku	0.827	0.820	0.835	**<0.001
Papua	-	-	-	-
Residence type				
Urban	1.135	1.133	1.137	**<0.001
Rural	-	-	-	-
Age groups				
≤17 years	-	-	-	-
18–64 years	1.387	1.381	1.392	**<0.001
≥65 years	3.072	3.059	3.086	**<0.001
Gender				
Male	-	-	-	-
Female	1.200	1.198	1.201	**<0.001
Marital status				
Never in union	-	-	-	-
Married/living with partner	2.339	2.334	2.345	**<0.001
Divorced/widowed	1.948	1.942	1.954	**<0.001
Educational level				
No Education	-	-	-	-
Primary	1.161	1.157	1.164	**<0.001
Secondary	1.111	1.108	1.115	**<0.001
Higher	1.190	1.186	1.194	**<0.001
Occupation				
No work	-	-	-	-
Civil servant/army/police	0.683	0.681	0.685	**<0.001
Private sector	0.580	0.579	0.582	**<0.001
Entrepreneur	0.658	0.657	0.660	**<0.001
Farmer/fisherman/labor	0.573	0.571	0.574	**<0.001
Others	0.837	0.835	0.839	**<0.001
Wealth status				
Poorest	-	-	-	-
Poorer	1.247	1.244	1.251	**<0.001
Middle	1.520	1.516	1.523	**<0.001
Richer	1.856	1.852	1.861	**<0.001
Richest	2.534	2.528	2.540	**<0.001
Health insurance				
Uninsured	-	-	-	-
Government-run	2.940	2.934	2.945	**<0.001
Private-run	2.928	2.918	2.938	**<0.001
Government- and private-run insurance	5.096	5.073	5.119	**<0.001
Travel Time				
≤1 h	1.475	1.471	1.478	**<0.001
>1 h	-	-	-	-

Note: ∗$P < 0.010$; ∗∗$P < 0.001$; AOR, adjusted odds ratio; CI: confidence interval.

Table 2 presents the disparity between regions in hospital utilization in Indonesia in 2018. The respondents in Sumatra were 1.079 times (95% confidence interval (CI) 1.073–1.085) more likely than those in Papua to utilize the hospital. Moreover, those in Java–Bali (1.075 times, 95% CI 1.069–1.081), Nusa Tenggara (1.106 times, 95% CI 1.099–1.113), Sulawesi (1.008 times, 95% CI 1.002–1.014), and Kalimantan (1.212 times, 95% CI 1.205–1.219) were more likely to utilize the hospital than those in Papua. However, the respondents in Maluku were only 0.827 (95% CI 0.820–0.835) times as likely as those in Papua to utilize the hospital. Regarding hospital utilization, Maluku had the lowest prevalence, followed by Papua, Sulawesi, Java–Bali, Sumatra, Nusa Tenggara, and Kalimantan.

Table 2 also presents six demographic variables related to hospital utilization in Indonesia, namely, age, gender, marital status, educational level, occupation, and wealth status. The older the person, the higher his/her chances of utilizing the hospital. Furthermore, regarding gender, females had a higher probability of utilizing the hospital than males. On the other hand, the study found that all the control variables were significantly related to hospital utilization in Indonesia. People living in urban areas were 1.135 times more likely to utilize the hospital than those in rural areas (adjusted odds ratio (AOR) 1.135; 95% CI 1.133–1.137).

According to marital status, all marital status has a better chance of using the hospital than someone never in a union. Regarding educational level, those who had primary, secondary, and higher education had a higher probability of utilizing the hospital than those who did not have education. Regarding occupation, those who had occupation had a better chance of using the hospital than those who were not working. Moreover, based on wealth status, Table 2 demonstrates that the richer the person, the higher the probability of him/her utilizing the hospital.

Regarding health insurance, those with government-run insurance were 2.940 times more likely to use the hospital than the uninsured ones (AOR 2.940; 95% CI 2.934–2.945). Those with private-run insurance were 2.928 times more likely than the uninsured ones to utilize the hospital (AOR 2.928; 95% CI 2.918–2.938). Furthermore, those with government- and private-run insurance were 5.096 times more likely than the uninsured ones to use the hospital (AOR 5.096; 95% CI 5.073–5.119).

As for the travel time to the hospital, those with ≤1-h travel time were 1.475 times more likely than those with >1-h travel time to utilize the hospital (AOR 1.475; 95% CI 1.471–1.478). The result indicates that a shorter travel time increases the possibility of using the hospital.

Discussion

The study result indicated that there were disparities in hospital utilization between regions in Indonesia in 2018. Furthermore, the geographical differences in terms of access to health services were undeniable. As is known, Indonesia is a country consisting of islands with different geographical conditions. The unequal population concentration between regions worsens the situation. Thus, health service facilities need to be developed, including unevenly distributed hospitals.[11] Many hospitals or health facilities are built in densely populated areas for economic reasons. Thus, it is not surprising that they are located close to each other, making it easier for people to use them.[25]

Meanwhile, in sparsely populated areas, such as Papua, there are few hospitals, and people must travel tens of kilometers to use them. The conditions are more difficult in hills and mountains.[14,15,26] In the USA, racial and ethnic minority populations experience health and healthcare differences arising from interacting factors, including racism and discrimination, social factors, access to and quality of health care, individual behavior, and

biology.[27] Understanding the health system's culture, behavior, and elements that contribute to these disparities is necessary.[28]

This study found that those living in urban areas are more likely to utilize the hospital than those living in rural areas. This finding is consistent with the research results on women in Sub-Saharan Africa accessing health services. This study indicated that women living in urban areas are 1.25 times more likely to use health services than those in rural areas.[29] This is also the case of the research results in China. Research on older adults demonstrated that older people in rural areas have less access to health services than seniors in urban areas.[30] Other studies also had similar results, which indicated that people living in urban areas are more likely to get health care, undergo outpatient care, or be hospitalized than those in rural areas.[31] The differences between urban and rural areas in the availability of healthcare facilities are undeniable. In urban areas, health service facilities are relatively adequate.[32] Meanwhile, these facilities are very limited in rural areas and sometimes even nonexistent. The lack or absence of these health service facilities causes people in rural areas not to use health services more minor.[33]

The results indicated that the older the person, the higher his/her chances of utilizing the hospital. Furthermore, regarding gender, females had a higher probability of utilizing the hospital than males. The older a person gets, the more likely he/she is to suffer from degenerative diseases, such as hypertension, heart failure, stroke, diabetes mellitus, kidney failure, and other chronic diseases (e.g., cancer, stroke). Thus, it is not surprising that the older you get, the more likely you will use healthcare facilities for outpatient and inpatient care.[34–36] Contrary to the study results, research on the use of outpatient services in first- and advanced-level health facilities demonstrated that outpatient services are used more by men than women.[37–39]

All marital status has a better chance of using the hospital than someone never in a union. In addition, those with primary, secondary, and higher education are more likely to utilize the hospital than those with no education. A person living without a partner is less likely to have a companion when going to a health facility than a person with a partner or a married one. Thus, it is unsurprising that access to health facilities is much lower among people with a partner. Research specifically on women in Tanzania demonstrated that apart from poverty, unemployment, and increasing age, people with no partner have more problems accessing health services than those with a partner.[40–42] In addition, the higher a person's educational level, the better the knowledge level, including knowledge of health. The results of previous studies indicated that a good level of health knowledge is associated with increased visits to healthcare facilities, health checks, and a person's health status.[43,44] Moreover, previous studies found that education is a strong determinant of various outputs in the health sector.[45–47]

Working people have a better chance of utilizing the hospital than non-working ones. In addition, the richer the person, the higher the probability of him/her utilizing the hospital. In general, the rewards/wages for working people are in the form of money, not goods (food, clothing, etc.). Having work means that a person will have money that can be used to meet his/her daily needs, including health services.[40,48] On the other hand, hospital care costs are relatively higher than the service costs at primary health facilities, especially if a person requires hospitalization. The condition is undoubtedly an obstacle for people who do not work, have no income, or are poor, especially if they do not have health insurance.[49] Working people who have better economic status have a high probability of utilizing the hospital.[50] Thus, it is not surprising that richer people are more capable of accessing health services at the hospital than the poor.

Meanwhile, the study demonstrated that health insurance ownership can increase hospital utilization. The study results in the capital city of Iran, Tehran, indicated that some

people do not utilize healthcare facilities and choose to do treatment at home because they do not have sufficient funds or the cost of health services is high.[51] Improved access to healthcare facilities for both outpatients and inpatients, including increased routine care for chronic conditions and improved healthcare quality for low-income people, is associated with expanded coverage of health insurance programs.[52] In addition, the health financing scheme assistance provided by the government can increase the use of health services for the rural poor.[53] The results of previous studies indicated that barriers to access and financing are related to the use of health services; mothers who have health insurance and a higher economic status have a more excellent opportunity to take advantage of health services.[54,55]

Regarding the travel time to the hospital, people with 10-min time travel to the hospital are more likely to utilize it than those with >10-min travel time. It is undeniable that distance significantly affects the utilization of healthcare facilities and that a close distance increases the possibility of people accessing healthcare facilities if they experience health problems. On the other hand, a long distance cause a person to be reluctant to access health services, especially with inadequate transportation, lack of public transportation, and poor road conditions.[56] Thus, the disadvantage for people living in rural areas in accessing healthcare facilities is the long travel time.[57] The study results confirm the results of previous studies that a close distance to the hospital increases repeat visits among inpatients.[58,59]

Strengths and limitations

The research examines a large-scale data source to provide information on a national scale. However, as the study was based on secondary data, the variables evaluated were limited to acceptable ones. Other factors linked to hospital utilization that have been established in previous studies, such as supplier-induced demand, cost of travel to the hospital, and disease type, could not be investigated.[15,32,60,61]

Conclusion

Based on the results, it can be concluded that regional disparities exist in hospital utilization in Indonesia. Regarding hospital utilization, Maluku had the lowest prevalence, followed by Papua, Sulawesi, Java–Bali, Sumatra, Nusa Tenggara, and Kalimantan.

Moreover, six demographic variables were found to be related to hospital utilization in Indonesia, namely, age, gender, marital status, educational level, occupation, and wealth status, as well as three other control variables, namely, residence type, health insurance, and travel time to the hospital.

** ** **

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Contributors

ADL developed the proposal, analyzed the patient data, and interpreted it. RDW was a significant contributor in conducting the study, interpreting the data, and writing the manuscript. NR, RR, and TT significantly contributed to conducting the research and writing the manuscript. All authors read and approved the final manuscript.

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Patient consent for publication
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Ethics approval
The National Ethics Committee granted Ethical Clearance for the 2018 Indonesian Basic Health Survey (Number: LB.02.01/2/KE.024/2018). The survey deleted all the identities of the respondents from the dataset. For their participation in the survey, the respondents provided written consent. The authors have obtained permission to use data for this study through the following website: https://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/.

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Data availability statement
The author cannot publicly share the data from the study because a third party owns the data. The 2018 Indonesian Basic Health Survey dataset is available from the website http://www.litbang.kemkes.go.id/layanan-permintaan-data-riset/ for researchers who meet the criteria for access to confidential data.

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References

1. Kemenkes R, Menteri P. Kesehatan Republik Indonesia Nomor 001 Tahun; 2012 Tentang Sistem Rujukan Pelayanan Kesehatan Perorangan. Report Number : nomor 001. Jakarta, Indonesia.
2. the Minister of Health of the Republic of Indonesia. Regulation of the minister of health of the republic of Indonesia Number 71 of 2013 concerning health services in the National Health Insurance. Jakarta, Indonesia: Kementerian Kesehatan Republik Indonesia; 2013p. 28.
3. Nurlinawati I, Rosita R. Persepsi peserta JKN terhadap Penyelenggara pelayanan kesehatan rujukan. *J Penelit Pengemb Pelayanan Kesehat* 2018;**2**:38–46.
4. Ratnasari D, Rujukan Berjenjang APS, di Puskesmas Bagi PJKN, Surabaya XK. J Adm Kesehat Indones 2017;**5**:145–54.

5. The Ministry of Health of The Republic of Indonesia. *Handbook of National Health Insurance for Key Populations* [*Buku Panduan Jaminan Kesehatan Nasional Bagi Populasi Kunci*]. Indonesia: Jakarta. p. 3–4; 2016. Available from: www.Jkn.Kemkes.Go.Id.
6. Direktorat pelayanan kesehatan. Rujukan. Laporan akuntabilitas kinerja Instansi pemerintah. Jakarta, Indonesia: Kementerian Kesehatan Republik Indonesia; 2020. 77 p.
7. Rukmini RB, Nantabah Z, Ruangan Pelayanan KDK, Topografi PB. Demografi dan geografi di indonesia. *Boll Penelit Sist Kesehat* 2012;**15**:408–17.
8. Megatsari H, Dwi Laksono A, Akhsanu Ridlo I, *et al*. Perspektif masyarakat tentang akses pelayanan kesehatan community perspective about health services access. *Boll Penelit Sist Kesehat* 2018;**21**:247–53.
9. Lestari PAP, Roesdiyanto R, Ulfah NH. Kebutuhan Kesehatan dan Akses Pelayanan Kesehatan dengan Kepesertaan Badan Penyelenggara Jaminan Sosial (BPJS) Kesehatan. *J Penelit dan Pengemb Kesehat Masy Indones* 2020;**1**:138–56.
10. Maulany RF, Dianingati RS. Annisaa' E. Faktor-Faktor yang Mempengaruhi Akses Kesehatan. *Indones J Pharm Nat Prod* 2021;**4**:142–9.
11. Mahmudiono T, Laksono AD. Disparity in the hospitals utilization among regions in Indonesia. *Open Access Maced J Med Sci* 2021;**9**:1461–6.
12. Mulyanto J, Kunst AE, Kringos DS. Geographical inequalities in healthcare utilisation and the contribution of compositional factors: A multilevel analysis of 497 districts in Indonesia. *Health Place* 2019;**60**:102236. doi: 10.1016/j.healthplace.2019.102236, PMID 31778844.
13. Maryani H, Kristiana L, Paramita A, *et al*. Disparitas pembangunan kesehatan di indonesia berdasarkan Indikator keluarga sehat menggunakan analisis cluster. *Boll Penelit Sist Kesehat* 2020;**23**:18–27. doi: 10.22435/hsr.v23i1.2622.
14. Wulandari RD, Laksono AD, Matahari R, *et al*. Performance of Maternal and Child Health Services in Papua in 2018: does the input of midwives and doctors have an effect? [Kinerja Pelayanan Kesehatan Ibu dan Anak di Papua Tahun 2018: apakah input tenaga bidan dan dokter berpengaruh?]. *Boll Penelit Sist Kesehat* 2021;**24**:275–85.
15. Laksono AD, Wulandari RD. Predictors of hospital utilization among papuans in Indonesia. *Indian J Forensic Med Toxicol* 2020;**14**:2319–24.
16. Laksono AD, Wulandari RD, Soedirham O. Urban and rural disparities in hospital utilization among Indonesian adults. *Iran J Public Health* 2019;**48**:247–55. PMID 31205878.
17. Kareth Y, Purnami CT, Sriatmi A. Evaluation on the implementation of maternal and child health service reporting by coordinator midwives at Primary Healthcare Centers in Nabire District, papua province. *J Manaj Kesehat Indones* 2015;**3**:1–10.
18. Nurrizka RH, Wahyono TYM. Disparitas Kematian Maternal di Indonesia: studi Ekologi dengan Analisis Spasial. *Media Kesehat Masy Indones* 2018;**14**:119–27.
19. Kusworo DL, Nur M, Fauzi K, *et al*. Primary health care improvement: jaminan pelayanan kesehatan di daerah Terdampak pada masa Mitigasi Covid-19. *Khatulistiwa Law Rev* 2021;**2**:329–47.
20. Wulandari RD, Laksono AD, Nantabah ZK, *et al*. Hospital utilization in Indonesia in 2018: do urban-rural disparities exist? *BMC Health Serv Res* 2022;**22**:491. doi: 10.1186/s12913-022-07896-5, PMID 35413914.
21. Putri RN. Perbandingan sistem kesehatan di negara Berkembang dan negara Maju. Jambi: J Ilm University Batanghari. p. 19(1):139; 2019.
22. National Institute of Health Research and Development of the Ministry of Health of The Republic of Indonesia. *Jakarta*. p. 99; 2018. The Indonesian basic health survey [internet] [cited Oct 7 2021]. Available from:

http://labdata.litbang.kemkes.go.id/images/download/laporan/RKD/2018/Laporan_Nasional_RKD2018_FINAL.pdf.
23. Agung Dwi Laksono, Ratna Dwi Wulandari, Oedojo Soedirham. Regional disparities of Health Center utilization in rural Indonesia. *Malays J Public Heal Med* 2019;**19**:158–66. doi: 10.37268/mjphm/vol.19/no.1/art.48.
24. Wulandari RD, Qomarrudin MB, Supriyanto S, *et al*. Socioeconomic disparities in hospital utilization among elderly people in Indonesia. *Indian J Public Heal Res Dev* 2019;**10**:1800–4.
25. Laksono AD, Wulandari RD. Regional disparities of facility-based childbirth in Indonesia. *Trends Sci* 2021;**18**:387. doi: 10.48048/tis.2021.387.
26. Laksono AD, Nugraheni WP, Ipa M, Rohmah N, Wulandari RD. The role of government-run insurance in primary health care utilization: A cross-sectional study in papua region, Indonesia, in 2018. *Int J Health Serv* 2022 [online first]:207314221129055. doi: 10.1177/00207314221129055, PMID 36154530.
27. Serchen J, Doherty R, Atiq O, Hilden D, Health and Public Policy Committee of the American College of Physicians. A comprehensive policy framework to understand and address disparities and discrimination in health and health care: A policy paper from the American College of Physicians. *Ann Intern Med* 2021;**174**:529–32. doi: 10.7326/M20-7219, PMID 33428444.
28. Wasserman J, Palmer RC, Gomez MM, *et al*. Advancing health services research to eliminate health care disparities. *Am J Public Health* 2019;**109**:S64–9. doi: 10.2105/AJPH.2018.304922, PMID 30699021.
29. Tessema ZT, Worku MG, Tesema GA, *et al*. Determinants of accessing healthcare in Sub-Saharan Africa: A mixed-effect analysis of recent Demographic and Health Surveys from 36 countries. *BMJ Open* 2022;**12**:e054397. doi: 10.1136/bmjopen-2021-054397, PMID 35105635.
30. Zhang X, Dupre ME, Qiu L, *et al*. Urban-rural differences in the association between access to healthcare and health outcomes among older adults in China. *BMC Geriatr* 2017;**17**:151. doi: 10.1186/s12877-017-0538-9, PMID 28724355.
31. Li J, Shi L, Liang H, Ding G, Xu L. Urban-rural disparities in health care utilization among Chinese adults from 1993 to 2011. *BMC Health Serv Res* 2018;**18**:102. doi: 10.1186/s12913-018-2905-4.
32. Laksono AD, Wulandari RD, Efendi F. Determinants of hospital utilisation among urban poor societies in Indonesia. *Int J Innov Creat Chang* 2020;**12**:375–87.
33. Wulandari RD, Laksono AD, Rohmah N. Urban-rural disparities of antenatal care in South East Asia: a case study in the Philippines and Indonesia. *BMC Public Health* 2021;**21**:1221. doi: 10.1186/s12889-021-11318-2, PMID 34167514.
34. Pratiwi NL, Rachmawaty T, Angkasawati TJ, *et al*. Dietary pattern and physical activity related to hypertension in Indonesia. *Indian J Forensic Med Toxicol* 2021;**1**:3802–10.
35. Ridwanah AA, Megatsari H, Laksono AD. Hypertension in Indonesia in 2018: an ecological analysis (December); 2020.
36. Yatnatti SK, Dias DA, Zihshan SM, *et al*. Enablers and barriers in utilization of geriatric welfare services among the elderly attending OPDs in a tertiary care hospital of Dakshina Kannada District: A cross-sectional study. *Ann Community Heal* 2021;**9**:223–9.
37. Valentina R, Pujianto. Factors related to the use of outpatient. *J Heal Sci* 2019;**13**:12–6.
38. Cantarero-Prieto D, Pascual-Sáez M, Torres JL. Socioeconomic determinants and health care utilization among elderly people living in Europe: evidence from the Survey of Health, Ageing and Retirement. Socioeconomic determinants and health care utilization among elderly people living in Europe: Evid; 2018.

39. Gajovic G, Janicijevic K, Andric D, *et al*. Gender differences in health care utilization among the elderly. *Serb J Exp Clin Res* 2019;**0**:1–9.
40. Bintabara D, Nakamura K, Seino K. Improving access to healthcare for women in Tanzania by addressing socioeconomic determinants and health insurance: a population-based cross-sectional survey. *BMJ Open* 2018;**8**:e023013. doi: 10.1136/bmjopen-2018-023013, PMID 30209158.
41. Megatsari H, Laksono AD, Herwanto YT, *et al*. Does husband/partner matter in reduce women's risk of worries?: study of psychosocial burden of Covid-19 in indonesia. *Indian J Forensic Med Toxicol* 2021;**15**:1101–6.
42. Laksono AD, Wulandari RD, Sukoco NEW, *et al*. Husband's involvement in wife's antenatal care visits in Indonesia: what factors are related? *J Public Health Res* 2022;**11**:1–8.
43. Megatsari H, Laksono AD, Ridlo IA, *et al*. Community perspective about health services access. *Bull Heal Syst Res* 2018;**21**:247–53.
44. Schulz M. The intertwined relationship between patient education, hospital waiting times and hospital utilization. *Heal Serv Manag Res* 2017;**30**:213–8. doi: 10.1177/0951484817725682, PMID 28816522.
45. Ipa M, Widawati M, Laksono AD, Kusrini I, Dhewantara PW. Variation of preventive practices and its association with malaria infection in eastern Indonesia: findings from community-based survey. *PLOS ONE* 2020;**15**:e0232909. doi: 10.1371/journal.pone.0232909, PMID 32379812.
46. Wulandari RD, Laksono AD. Education as predictor of the knowledge of pregnancy danger signs in Rural Indonesia. *Int J Innov Creat Chang* 2020;**13**:1037–51.
47. Putri NK, Laksono AD. Predictors of childbirth services in Indonesia. Int J Public Heal Sci. 2022;**11**:566–73. doi: 10.11591/ijphs.v11i2.21324.
48. Denny HM, Laksono AD, Matahari R, Kurniawan B. The determinants of four or more antenatal care visits among working women in Indonesia. *Asia Pac J Public Health* 2022;**34**:51–6. doi: 10.1177/10105395211051237, PMID 34670430.
49. Guo B, Xie X, Wu Q, *et al*. Inequality in the health services utilization in rural and urban China: A horizontal inequality analysis. *Med, United States* 2020;**99**:1–7.
50. Wulandari RD, Laksono AD, Prasetyo YB, Nandini N. Socioeconomic disparities in hospital utilization among female workers in Indonesia: A cross-sectional study. *J Prim Care Community Health* 2022;**13**:21501319211072679. doi: 10.1177/21501319211072679.
51. Motlagh SN, Mahani AS, Barooni M, *et al*. Determining factors related to health services utilization: case of Tehran Soraya. *Razi J Med Sci* 2015;**21**:60–72.
52. Mao W, Tang Y, Tran T, *et al*. Advancing universal health coverage in China and Vietnam: lessons for other countries. *BMC Public Health* 2020;**20**:1791. doi: 10.1186/s12889-020-09925-6, PMID 33238998.
53. Laksono AD, Wulandari RD, Zuardin Z, Nopianto N. The disparities in health insurance ownership of hospital-based birth deliveries in eastern Indonesia. *BMC Health Serv Res* 2021;**21**:1261. doi: 10.1186/s12913-021-07246-x, PMID 34802452.
54. Wulandari RD, Laksono AD, Matahari R. The effects of health insurance on maternity care in health services in Indonesia. *Int J Innov Creat Chang* 2020;**14**:478–97.
55. Andayani Q, Koesbardiati T, Prahastuti AD, *et al*. The barrier to access health insurance for maternity care: case study of female workers in Indonesia. *Medico-Legal Updat* 2021;**21**:926–32.
56. Varela C, Young S, Mkandawire N, *et al*. Transportation Barriers to Access Health Care for Surgical Conditions in Malawi: a cross sectional nationwide household survey 11

Medical and Health Sciences 1117 Public Health and Health Services. *BMC Public Health* 2019;**19**:article Number 264.
57. Yiengprugsawan VS, Dorj G, Dracakis JG, *et al*. Disparities in outpatient and inpatient utilization by rural-urban areas among older Mongolians based on a modified WHO-SAGE instrument. *BMC Health Serv Res* 2021;**21**:1183. doi: 10.1186/s12913-021-07156-y, PMID 34717613.
58. Jumriati SMF. Habibi. Reutilization of health services by general inpatients at sheikh Yusuf Hospital in 2019. *Higiene* 2020;**6**:1–7.
59. Laksono AD, Wulandari RD. Determinant of the puskesmas utilization in madura island. *Indian J Public Heal Res Dev* 2019;**10**:576–81.
60. Wei Y, Yu H, Geng J, *et al*. Hospital efficiency and utilization of high-technology medical equipment: A panel data analysis. *Heal Policy Technol* 2018;**7**:65–72.
61. Dzampe AK, Takahashi S. Competition and physician-induced demand in a healthcare market with regulated price: evidence from Ghana. *Int J Heal Econ Manag* 2021;**22**:295–313.

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

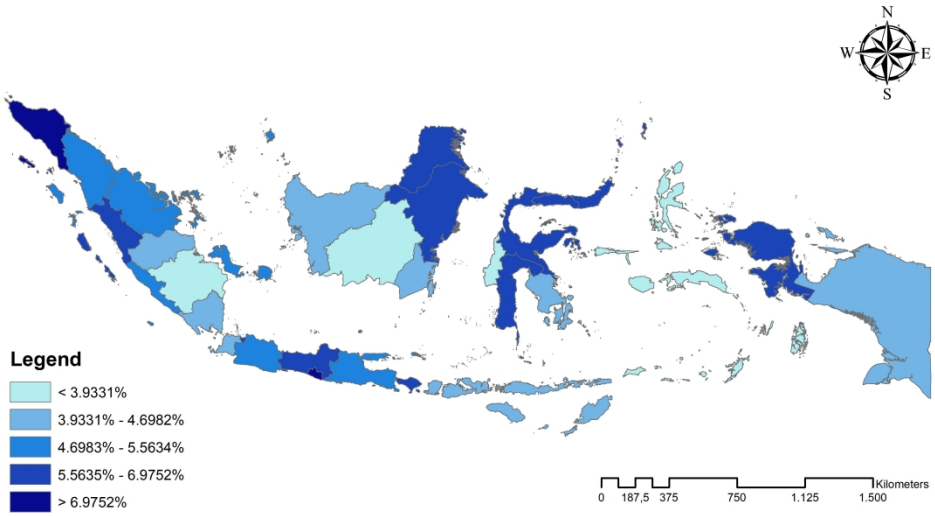

Figure 1. Region distribution map of hospital utilization by the province in Indonesia in 2018

191x108mm (600 x 600 DPI)

STROBE Statement—Checklist of items that should be included in reports of ***cross-sectional studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1-2
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3-4
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4
Bias	9	Describe any efforts to address potential sources of bias	
Study size	10	Explain how the study size was arrived at	4-5
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	5-6
		(*b*) Describe any methods used to examine subgroups and interactions	5-6
		(*c*) Explain how missing data were addressed	
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	
		(*e*) Describe any sensitivity analyses	
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	5
		(b) Give reasons for non-participation at each stage	5
		(c) Consider use of a flow diagram	
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	6-8
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	10
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	10-11

		(*b*) Report category boundaries when continuous variables were categorized	6-8
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	
		Discussion	
Key results	18	Summarise key results with reference to study objectives	11-12
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	11-12
		Other information	
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	13

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.