

ORIGINAL ARTICLE

REGIONAL DISPARITIES OF HEALTH CENTER UTILIZATION IN RURAL INDONESIA

*Agung Dwi Laksono^{1,2}, Ratna Dwi Wulandari³ and Oedojo Soedirham⁴

¹ National Institute of Health Research and Development, The Ministry of Health, The Republic of Indonesia. Jl. Percetakan Negara 29, Jakarta, Indonesia.

² Doctoral Program, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia.

³ Department of Health Policy and Administration, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

⁴ Department of Behavioural Science and Health Promotion, Faculty of Public Health, Universitas Airlangga, Surabaya, Indonesia

*Corresponding Author

Agung Dwi Laksono

Email: agung.dwi.laksono-2016@fkm.unair.ac.id

ABSTRACT

One indicator to see the quality of health system performance was to look at the disparity in the utilization of healthcare facilities. The research objective was to analyze the disparity between regions in the utilization of health centers in rural areas in Indonesia. The results of the 2013 Basic Health Survey (Riskesdas) were used as analysis material. The 2013 Riskesdas was designed a cross-sectional survey. Respondents obtained 388,598 using the multi-stage cluster random sampling method. Binary Logistic Regression Test was used to analyze data. Data is obtained through a structured questionnaire. The results showed that there were statistically significant disparities between regions. All regions showed better utilization than the Papua region as a reference. The best utilization was in the Sumatra region, which was 3.781 times more utilizing health centers than the Papua region (OR = 3.781; 95% CI = 3.580-3.993). The utilization of health centres that approached the Papua region was the Nusa Tenggara region (OR = 1.582; 95% CI = 1.490-1.679) and the Maluku region (OR = 2.175; 95% 1.999-2.366). All three regions are all in the Eastern part of Indonesia. The research concluded there was a disparity in health center utilization between regions in rural Indonesia. Regions in the western part of Indonesia tend to have better health center utilization in rural areas. Research results could be used as a reference for making policies that focus on equality of services to reduce existing disparities.

Keywords: the health center, utilization, region disparities, rural, Indonesia.

INTRODUCTION

Indonesia has implemented many improvements to people's access to health services. This condition has also been recognized as better than before¹. Although in some cases the community still feels health services are not appropriate as expected^{2,3}. Furthermore, the health status of the community as the outcome also varies greatly between regions⁴.

One indicator to see the quality of health system performance is to look at the disparity in the use of healthcare facilities. The dimension in analyzing the disparity in the use of health services that is often used is the dimensions of urban-rural, gender, socioeconomic, education, employ status, racial and ethnic, geographic, and region⁵⁻⁷.

Health development that has been running in Indonesia still shows disparities between urban and rural areas. Urban areas tend to have access to better health services. This condition was found because of the participation of private parties who prefer urban areas with denser population density conditions, making it more economically profitable⁸⁻¹⁰. This reason is the basis of the

assumption that rural areas are more vulnerable than in urban areas.

Disparities in health services that occur between urban and rural areas contribute to the increase in the number of people suffering from chronic diseases in the countryside^{11,12}. If allowed to continue, there will be a considerable opportunity lost that must be borne by the community and the government. In this position, the role of the Puskesmas (health center) as a gatekeeper is very important to screen patients at the basic service level¹³⁻¹⁵.

The disparity in the utilization of health care facilities is allegedly not only in the urban-rural dimension but also between regions. This condition is likely to occur because of Indonesia's highly variable geographical conditions and an archipelago with more than 16 thousand islands¹⁶. Based on this background, the aim of this study is intended to analyze the disparity between regions in health center utilization in rural areas in Indonesia.

MATERIALS AND METHODS

The data used in this research analysis comes from the 2013 Indonesian Basic Health Survey (Riskesdas). Riskesdas was a national scale survey conducted in a cross-sectional by the Ministry of Health. Riskesdas sample was carried out by multi-stage cluster random sampling.

The sample framework used consists of two types, namely the sample frame for sampling the first stage and the sample frame for sampling the second stage. The first selection sample frame was the primary sampling unit (PSU) list in the sample master. The number of PSUs in the master sample was 30,000 which were selected by probability proportional to size (PPS) with the number of households resulting from the 2010 Population Census (PC2010). The PSU was a combination of several census blocks (CB) which were working areas of the PC2010 enumeration team. The PSU also features information on the number and list of names of household heads, address, level of education of the head of the household based on urban/rural area classification. The second selection sample frame was all census buildings in which there are ordinary households not including institutional household (orphanage, police/military barracks, etc.) resulting from the complete enumeration of PC2010 (PC2010-C1). Selected census buildings and households within the selected census building were updated. The update was carried out by the 2013 Riskesdas enumerator before starting to conduct interviews.

The sampling method used was a three-stage stratified sampling. The stages of this method were described as follows: The first step was to select the primary sampling unit (PSU) from the systematically selected PSU for each district/city according to the domain allocation. The second stage, from the selected PSU, 2 CB was selected by PPS with the number of households in the 2010 Population Census - Recapitulation of the number of households resulting from listing (PC2010-RBL1) in each district/city according to the domain allocation. Then one block randomly selected for Riskesdas and one census block for Susenas. The third stage, from each CB of Riskesdas, a number of census buildings ($m = 25$) were selected systematically based on the PC2010-C1 census building data.

The data was taken using a structured questionnaire¹⁷. The contents of the questionnaire consisted of information on individual characteristics (age, gender, marital status,

education level, employment status, socioeconomic status, insurance, time travel, and transportation cost to health center) and health center utilization (outpatient and inpatient).

The population in this study were all adults in rural areas in Indonesia. The criteria of the respondents were residents aged 15 years and above. Respondents were considered adults at that age. The 2013 Riskesdas has been conducted with a sample of 1,027,763 individuals. The samples analyzed in this paper were based on a unit of analysis of Indonesian adults in rural areas with 388,598 respondents. Samples were selected with inclusion criteria ≥ 15 years old and willing to be interviewed.

The health center utilization was the use of outpatient or inpatient care to the Puskesmas. The criteria for outpatient were the utilization of the last month. While the criteria for inpatient were the utilization of the past year. This criterion was carried out assuming the respondent can still remember the occurrence of the utilization. The division of regions was grouped by the largest island. Divided into 7 regions, namely Sumatra, Kalimantan, Sulawesi, Java-Bali, Maluku Islands, Nusa Tenggara, and Papua¹⁸.

T-tests were used for age variables which were categorized as continuous variables. Chi-Square is used to test dichotomous variables. There are 8 dichotomous variables tested, namely age, sex, marital status, education level, employment status, insurance ownership, travel time, and the transportation cost to the Puskesmas. These statistical tests were to assess whether there was a statistically significant relationship between the independent variables and the Puskesmas utilization as the dependent variable. Processing data using the help of SPSS v.21 software.

The 2013 Riskesdas has an ethical permit approved by the national ethical committee (ethic number: 01.1206.207). During data collection, informed consent was used. This is by considering the aspects of procedures for data collection, voluntary, and confidentiality.

RESULT

Table 1 explains descriptively the participants in this study. It appears that participants start from the age of 15 to 128 years. The mean age of participants is 40.18 years, with Standard Deviation 16.334.

Table 1 Descriptive Table of The Participants (n=388,598)

Variables	N	Percentage
Age	388,598	100%
Gender		
• Male (code=1)	188,596	48.5%
• Female (code=2)	200,002	51.5%
Marital status		
• Single (code=1)	82,276	21.2%
• Married (code=2)	277,720	71.5%
• Divorced (code=3)	28,602	7.4%
Education level		
• Primary school & under (code=1)	232,779	59.9%
• Junior high school (code=2)	77,177	19.9%
• Senior high school (code=3)	64,488	16.6%
• College (code=4)	14,154	3.6%
Employment status		
• Employed (code=1)	243,085	62.6%
• Unemployed (code=2)	145,513	37.4%
Socioeconomic status		
• Quintile 1 (code=1)	116,155	29.9%
• Quintile 2 (code=2)	98,949	25.5%
• Quintile 3 (code=3)	76,532	19.7%
• Quintile 4 (code=4)	54,969	14.1%
• Quintile 5 (code=5)	41,993	10.8%
Insurance		
• No insurance (code=1)	166,386	42.8%
• Managed by Gov. (code=2)	218,063	56.1%
• Others (code=3)	4,149	1.1%
Time travel		
• ≤ 10 minutes (code=1)	146,412	37.7%
• > 10 minutes (code=2)	242,186	62.3%
Transportation cost		
• ≤ IDR 10,000 (code=1)	295,090	75.9%
• > IDR 10,000 (code=2)	93,508	24.1%

Descriptive Result

Figure 1 explains that the main health center users are poor people. Those in the quintile 1 and 2 groups at the socioeconomic level are more likely to use health centers than other groups. This condition applies to all regions. This picture is more evident in regions in Eastern Indonesia, namely in Papua, Maluku Islands and Nusa Tenggara.

Based on Table 1, it can be seen that there is a significant difference between the region variables and all variables tested. Table 1 also explains that based on the proportion of people who use health

centers, they are mostly in the Nusa Tenggara region (8.0%). Medium age variables have the youngest average in the Papua region (36.48) and the oldest in the Java-Bali region (43.28).

Based on gender, Table 1 shows that in all regions female dominate, except for the Papua region which is dominated by male (51.8%). Based on marital status, Table 1 shows all regions dominated by marital status of married. While based on the level of education, table 1 shows that in all regions it is dominated by society with a level of education of primary school and under.

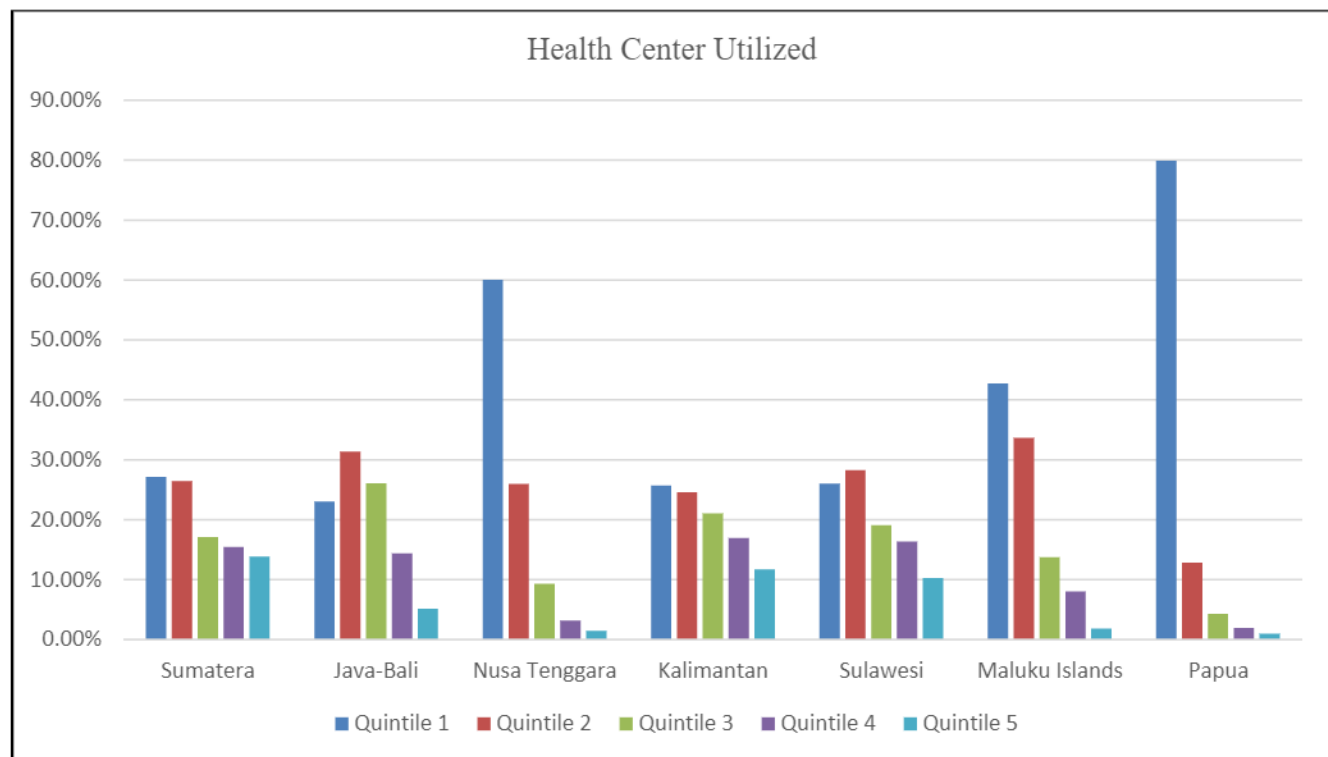


Figure 1 Distribution of health center utilized in rural Indonesia based on regions and socioeconomic status

Table 2a Descriptive Statistic of Health Center Utilization among Regions in Rural Indonesia (n=388,598)

Characteristic	Region							All	P-value
	Suma- tera	Java- Bali	Nusa Tenggara	Kaliman- tan	Sulawe- si	Malu- ku	Papua		
Health Center Utilization									<0.001*
• Utilized	3,730 3.0%	4,412 4.4%	2,231 8.0%	1,512 3.9%	3,442 5.9%	770 5.6%	2,805 12.1%	18,902 4.9%	
• Not utilized	122,167 97.0%	95,860 95.6%	25,654 92.0%	37,483 96.1%	55,350 94.1%	12,878 94.4%	20,304 87.9%	369,696 95.1%	
Age (mean)	125,897 (38.58)	100,272 (43.28)	27,885 (40.53)	38,995 (38.86)	58,792 (40.65)	13,648 (39.29)	23,109 (36.48)	388,598 (40.18)	<0.001*
Gender									<0.001*
• Male	62,187 49.4%	47,534 47.4%	13,216 47.4%	19,282 49.4%	27,930 47.5%	6,473 47.4%	11,974 51.8%	188,596 48.5%	
• Female (Ref.)	63,710 50.6%	52,738 52.6%	14,669 52.6%	19,713 50.6%	30,862 52.5%	7,175 52.6%	11,135 48.2%	200,002 51.5%	
Marital status									<0.001*
• Single	31,921 25.4%	16,641 16.6%	6,531 23.4%	7,840 20.1%	12,520 21.3%	2,893 21.2%	3,930 17.0%	82,276 21.2%	
• Married	85,728 68.1%	73,938 73.7%	19,780 70.9%	28,492 73.1%	41,625 70.8%	10,037 73.5%	18,120 78.4%	277,720 71.5%	
• Divorce (Ref.)	8,248 6.6%	9,693 9.7%	1,574 5.6%	2,663 6.8%	4,647 7.9%	718 5.3%	1,059 4.6%	28,602 7.4%	

Table 2b Descriptive Statistic of Health Center Utilization among Regions in Rural Indonesia (n=388,598)

Characteristic	Region							All	P-value
	Suma- tera	Java- Bali	Nusa Tenggara	Kaliman- tan	Sulawe- si	Malu- ku	Papua		
Education level									<0.001*
• Primary sch. & under	64,969 51.6%	68,676 68.5%	18,840 67.6%	24,042 61.7%	34,137 58.1%	7,294 53.4%	14,821 64.1%	232,779 59.9%	
• Junior high sch.	29,192 23.2%	17,433 17.4%	4,305 15.4%	7,689 19.7%	11,696 19.9%	2,991 21.9%	3,871 16.8%	77,177 19.9%	
• Senior high sch.	26,779 21.3%	11,678 11.6%	3,774 13.5%	5,855 15.0%	10,244 17.4%	2,728 20.0%	3,430 14.8%	64,488 16.6%	
• College (Ref.)	4,957 3.9%	2,485 2.5%	966 3.5%	1,409 3.6%	2,715 4.6%	635 4.7%	987 4.3%	14,154 3.6%	
Employment status									<0.001*
• Employed	79,050 62.8%	64,697 64.5%	19,057 68.3%	25,357 65.0%	31,637 53.8%	7,866 57.6%	15,421 66.7%	243,085 62.6%	
• Unemployed	46,847 37.2%	35,575 35.5%	8,828 31.7%	13,638 35.0%	27,155 46.2%	5,782 42.4%	7,688 33.3%	145,513 37.4%	
Socioeconomic status									<0.001*
• Quintile 1	29,269 23.2%	20,609 20.6%	15,760 56.5%	10,847 27.8%	17,185 29.2%	6,118 44.8%	16,367 70.8%	116,155 29.9%	
• Quintile 2	30,017 23.8%	28,907 28.8%	7,119 25.5%	9,773 25.1%	15,265 26.0%	4,106 30.1%	3,762 16.3%	98,949 25.5%	
• Quintile 3	24,978 19.8%	25,751 25.7%	2,935 10.5%	7,878 20.2%	11,326 19.3%	2,126 15.6%	1,538 6.7%	76,532 19.7%	
• Quintile 4	20,339 16.2%	16,717 16.7%	1,448 5.2%	5,759 14.8%	8,686 14.8%	1,016 7.4%	1,004 4.3%	54,969 14.1%	
• Quintile 5 (Ref.)	21,294 16.9%	8,288 8.3%	623 2.2%	4,738 12.2%	6,330 10.8%	282 2.1%	438 1.9%	41,993 10.8%	
Insurance ownership									<0.001*
• No insurance	56,741 45.1%	51,068 50.9%	9,191 33.0%	19,296 49.5%	18,029 30.7%	5,637 41.3%	6,424 27.8%	166,386 42.8%	
• Managed by Gov.	67,294 53.5%	48,640 48.5%	18,605 66.7%	18,801 48.2%	40,544 69.0%	7,965 58.4%	16,214 70.2%	218,063 56.1%	
• Others (Ref.)	1,862 1.5%	564 0.6%	89 0.3%	898 2.3%	219 0.4%	46 0.3%	471 2.0%	4,149 1.1%	
Time travel									<0.001*
• ≤ 10 minute	45,372 36.0%	33,028 32.9%	9,805 35.2%	17,144 44.0%	23,847 40.6%	7,285 53.4%	9,931 43.0%	146,412 37.7%	
• > 10 minutes	80,525 64.0%	67,244 67.1%	18,080 64.8%	21,851 56.0%	34,945 59.4%	6,363 46.6%	13,178 57.0%	242,186 62.3%	
Transportation cost									<0.001*
• ≤ IDR 10,000	91,231 72.5%	83,146 82.9%	20,716 74.3%	27,321 70.1%	46,638 79.3%	9,458 69.3%	16,580 71.7%	295,090 75.9%	
• > IDR 10,000	34,666 27.5%	17,126 17.1%	7,169 25.7%	11,674 29.9%	12,154 20.7%	4,190 30.7%	6,529 28.3%	93,508 24.1%	

Note: Chi-Square test was used for dichotomous variables, and T-test for continuous variables; *Significant at level 95%.

Table 2a shows that based on working status is dominated by those who have jobs, with the largest proportion in the Nusa Tenggara region (68.3%). Based on socioeconomic conditions, those who live in the East are more dominated by the poor (quintile

1 and 2), especially in the Papua region, Maluku and Nusa Tenggara. Table 2b shows that based on insurance ownership is dominated by those who have insurance managed by the government (Askes, Jamkesmas, Jamkesda, Jamsostek), except Java-

Bali and Kalimantan regions which are dominated by those who do not have insurance.

Table 2b shows based on the time needed to reach the health center dominated by the category "> 10

minutes". However, based on the transportation costs needed to reach the health center, it was dominated by the "cost of IDR 10,000" transportation cost category. The biggest proportion is in the Java-Bali region (82.9%).

Multivariate Regression Analyses

Table 3 Binary Logistic Regression of Health Center Utilization among Regions in Rural Indonesia (n=388,598)

Predictor	Health Center Utilization			
	Sig.	OR	Lower Bound	Upper Bound
Region: Sumatera	<0.001*	3.781	3.580	3.993
Region: Java-Bali	<0.001*	2.773	2.627	2.927
Region: Nusa Tenggara	<0.001*	1.582	1.490	1.679
Region: Kalimantan	<0.001*	2.832	2.648	3.030
Region: Sulawesi	<0.001*	2.254	2.133	2.382
Region: Maluku	<0.001*	2.175	1.999	2.366
Age	<0.001*	0.994	0.992	0.995
Gender: Male	<0.001*	1.341	1.297	1.387
Marital Status: single	<0.001*	1.737	1.603	1.882
Marital Status: married	0.083	1.050	0.994	1.109
Education: under primary school	0.262	0.952	0.873	1.038
Education: junior high school	0.286	0.952	0.869	1.042
Education: senior high school	0.558	0.973	0.888	1.066
Employment status: Employed	<0.001*	1.091	1.054	1.129
Socioeconomic: quintile 1	<0.001*	0.698	0.654	0.745
Socioeconomic: quintile 2	<0.001*	0.743	0.696	0.793
Socioeconomic: quintile 3	<0.001*	0.808	0.756	0.864
Socioeconomic: quintile 4	<0.001*	0.820	0.764	0.879
Insurance ownership: No insurance	0.966	0.996	0.812	1.221
Insurance: Managed by Gov.	<0.001*	0.482	0.393	0.590
Travel time: ≤ 10 minutes	<0.001*	0.917	0.889	0.945
Transportation cost: ≤ IDR 10,000	<0.001*	0.551	0.528	0.574

Note: The reference category is "Not Utilized"; 95% Confidence Interval for OR; *Significant at level 95%.

Table 3 represents the results of a binary logistic test. The results express that there are statistically significant disparities between regions. All regions show better utilization than the Papua region as a reference. The best utilization is in the Sumatra region, which is 3.781 times more utilizing health centers than the Papua region (OR = 3.781; 95% CI = 3.580-3.993). The utilization of health center which was slightly different from the Papua region was the Nusa Tenggara region (OR = 1.582; 95% CI = 1.490-1.679) and the Maluku region (OR = 2.175; 95% CI = 1.999-2.366). All three regions are all in the Eastern part of Indonesia.

Table 3 indicates that male had 1.341 times better utilization than female (OR = 1.341; 95% CI = 1.297-1.387). Those who have the marital status of singles have health center utilization 1.737 times better

than those divorced. While based on the level of education, no significant differences were found between levels of education in communities in rural Indonesia.

Table 3 shows that those who were employed 1.091 times were more likely to use health centers than those who were unemployed. Based on the socioeconomic level, no group has better health center utilization than the richest (quintile 5) group in rural Indonesia. Those in the poorest group (quintile 1) used the health center 0.698 times the richest group (OR = 0.698; 95% CI = 0.654-0.745).

DISCUSSION

The results of the study show that there are gaps between regions in the utilization of Puskesmas in

rural Indonesia. The geographical conditions of Indonesia and the disparity in urban-rural development are indeed very possible for disparities in the use of health centers. Geographical conditions in the form of islands make some small and remote islands very difficult to reach. This is also influenced by the availability of regular transportation to these remote islands^{10,19}. Several other studies on spatial health service disparities in several countries were also found to have the same conclusions²⁰⁻²³. Geographical conditions have proven to contribute significantly to the disparity between regions.

The results showed that the utilization of health centers in the West tends to be better than in the East. This condition is directly proportional to economic development in Indonesia, which indeed shows inequality between the West and East. Development in the East region tends to lag behind other regions (24)(25)(1), including health development^{4,26}.

As a single variable, low socioeconomic status (quintile 1 and 2) has the dominant proportion of health center utilization (see Figure 1), while in a multivariate manner, a group with high socioeconomic status (quintile 5) actually has better health center utilization. This shows that high socioeconomic groups are more aware of utilizing their health rights because they have relatively better knowledge⁴. Rich people who are knowledgeable are smarter in taking advantage of opportunities. The results of this study are in line with several studies related to socioeconomic in developing countries²⁷, and also other countries, namely USA²⁸, Bangladesh²⁹, Lao People's Democratic Republic³⁰, and in several European countries³¹.

Those who need more time to the health center (> 10 minutes) and more expensive transportation costs (> IDR 10,000; around \$1) have better health center utilization. This result is the impact of the low service tariff policy at the Puskesmas. Even in some regions, the local government actually frees the community to utilize the Puskesmas as a basic service^{2,32,33}.

Limitations in this study can only detect disparities that occur between regions only superficially. Further studies are needed that can detect how these disparities can occur.

CONCLUSIONS

Based on the research results and discussion it can be concluded that there is a proven disparity in health center utilization between regions in rural Indonesia. Regions in the western part of Indonesia

tend to have better health center utilization in rural areas. The disparity in health center utilization is also found in other categories, namely gender, marital status, employment status, socioeconomic level, insurance ownership, travel time and transportation costs to the health center. Structured policies are needed to reach rural communities. The results of this study can be used as a reference for making policies that focus on equality of services to reduce existing disparities.

ACKNOWLEDGMENTS

The author would like to thank the National Institute of Health Research and Development, Ministry of Health, who has agreed to allow the 2013 Riskesdas data to be analyzed in this article.

DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

FUNDING

No funding sources.

REFERENCES

1. Mubasyiroh R, Nurhotimah E, Laksono AD. Indeks Aksesibilitas Pelayanan Kesehatan di Indonesia. In: Supriyanto S, Chalidyanto D, Wulandari RD, editors. Aksesibilitas Pelayanan Kesehatan di Indonesia. Jogjakarta: PT Kanisius; 2016. p. 21-58.
2. Megatsari H, Laksono AD, Ridlo IA, Yoto M, Azizah AN. Community Perspective about Health Services Access. *Bul Penelit Sist Kesehat*. 2018;21:247-253.
3. Laksono AD, Nantabah ZK, Wulandari RD. Access Barriers to Health Center for Elderly in Indonesia. *Bul Penelit Sist Kesehat*. 2018;21(4):228-35.
4. Suparmi, Kusumawardani N, Nambiar D, Trihono, Hosseinpoor AR. Subnational regional inequality in the public health development index in Indonesia. *Glob Health Action*. 2018;11(1).
5. Park YJ, Martin EG. Geographic Disparities in Access to Nursing Home Services: Assessing Fiscal Stress and Quality of Care. *Health Serv Res*. 2018;53:2932-51.
6. 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.
7. Ault-Brutus A, Alegria M. Racial/ethnic differences in perceived need for mental health care and disparities in use of care among those with perceived need in 1990-1992 and 2001-2003. *Ethn Heal.* 2018;23(2):142-57.
8. Johar M, Soewondo P, Pujisubekti R, Satrio HK, Adji A. Inequality in access to health care, health insurance and the role of supply factors. *Soc Sci Med.* 2018;213:134-45.
9. Dewi A, Mukti AG. The strategy to achieve universal health coverage membership in Indonesia. *Res J Pharm Technol.* 2018;11(5):1774-7.
10. Laksono AD, Wulandari RD, Soedirham O. Urban and Rural Disparities in Hospital Utilization among Indonesian Adults. *Iran J Public Health [Internet].* 2019;48(2):247-55. Available from: <http://ijph.tums.ac.ir/index.php/ijph/article/view/16143>
11. Wang S, Kou C, Liu Y, Li B, Tao Y, D'Arcy C, et al. Rural-Urban Differences in the Prevalence of Chronic Disease in Northeast China. *Asia-Pacific J Public Heal.* 2014;1-13.
12. Cheng L, Tan L, Zhang L, Wei S, Liu L, Long L, et al. Chronic disease mortality in rural and urban residents in Hubei Province, China, 2008-2010. *BMC Public Health.* 2013;13(1).
13. Febriawati H, Alfansi L, Hadi ED, Ab SA. The role of management function to the achievement of Puskesmas indicator as a gatekeeper of national health guarantee in Bengkulu City. *Indian J Public Heal Res Dev.* 2018;9(9):353-7.
14. Hermansyah A, Sainsbury E, Krass I. Investigating the impact of the universal healthcare coverage programme on community pharmacy practice. *Heal Soc Care Community.* 2018;26(2):e249-60.
15. Istikmal, Wibowo TA, Yovita LV. Polygon WebGIS of distric level for development and monitoring of PUSKESMAS in health care services. In: *Proceeding of 2015 1st International Conference on Wireless and Telematics, ICWT 2015.* Manado: Institute of Electrical and Electronics Engineers Inc.; 2016.
16. United Nations Group of Experts on Geographical Names. United Nations Conference on the Standardization of Geographical Names , 11th [Internet]. 2017 [cited 2018 Sep 1]. Available from: <https://unstats.un.org/unsd/geoinfo/UNGE/GN/ungegnConf11.html>
17. National Institute of Health Research and Development of Ministry of Health of the Republic of Indonesia. The 2013 Indonesia Basic Health Survey (Riskesdas): National Report. Jakarta; 2013.
18. Kusumawardani N, Tarigan I, Suparmia, Schlottheuber A. Socio-economic, demographic and geographic correlates of cigarette smoking among Indonesian adolescents: results from the 2013 Indonesian Basic Health Research (RISKESDAS) survey. *Glob Health Action.* 2018;11.
19. Suharmiati, Laksono AD, Astuti WD. Review Kebijakan tentang Pelayanan Kesehatan Puskesmas di Daerah Terpencil Perbatasan. *Bul Penelit Sist Kesehat.* 2013;16(2):109-116.
20. O'Donnell TFX, Powell C, Deery SE, Darling JD, Hughes K, Giles K., et al. Regional variation in racial disparities among patients with peripheral artery disease. *J Vasc Surg.* 2018;68(2):519-26.
21. Tyler PD, Stone DJ, Geisler BP, McLennan S, Celi LA, Rush B. Racial and Geographic Disparities in Interhospital ICU Transfers. *Crit Care Med.* 2018;46(1):e76-80.
22. Rostami M, Karamouzian M, Khosravi A, Rezaeian S. Gender and geographical inequalities in fatal drug overdose in Iran: A province-level study in 2006 and 2011. *Spat Spatiotemporal Epidemiol.* 2018;25:19-24.
23. Momenyan S, Kavousi A, Poorolajal J, Momenyan N. Spatial inequalities and predictors of HIV/AIDS mortality risk in Hamadan, Iran: a retrospective cohort study. *Epidemiol Health.* 2018;40.
24. Yudhistira MH, Sofiyandi Y. Seaport status, port access, and regional economic development in Indonesia. *Marit Econ Logist.* 2018;20(4):549-68.
25. Indra I, Nazara S, Hartono D, Sumarto S. Expenditure inequality and polarization in

- Indonesia, 2002-2012. *Int J Soc Econ*. 2018;45(10):1469-86.
26. Afifah T, Nuryetty MT, Cahyorini, Musadad DA, Schlottheuber A, Bergen N, et al. Subnational regional inequality in access to improved drinking water and sanitation in Indonesia: results from the 2015 Indonesian National Socioeconomic Survey (SUSENAS). *Glob Health Action*. 2018;11.
27. Amo-Adjei J, Aduo-Adjei K, Opoku-Nyamah C, Izugbara C. Analysis of socioeconomic differences in the quality of antenatal services in low and middle-income countries (LMICs). *PLoS One*. 2018;13(2).
28. Yuan Y, Louis C, Cabral H, Schneider JC, Ryan CM, Kazis LE. Socioeconomic and Geographic Disparities in Accessing Nursing Homes With High Star Ratings. *J Am Med Dir Assoc*. 2018;
29. Boulton ML, Carlson BF, Power LE, Wagner AL. Socioeconomic factors associated with full childhood vaccination in Bangladesh, 2014. *Int J Infect Dis*. 2018;69:35-40.
30. Do N, Tran HTG, Phonvisay A, Oh J. Trends of socioeconomic inequality in using maternal health care services in Lao People's Democratic Republic from year 2000 to 2012. *BMC Public Health*. 2018;18(1).
31. Doganis D, Panagopoulou P, Tragiannidis A, Vichos T, Moschovi M, Polychronopoulou S, et al. Survival and mortality rates of Wilms tumour in Southern and Eastern European countries: Socioeconomic differentials compared with the United States of America. *Eur J Cancer*. 2018;101:38-46.
32. Gumilang MF, Eng KI, Galinium M. Assessment of service maturity of "Kartu Jakarta Sehat" application system. In: 2013 International Conference on Information Technology and Electrical Engineering: "Intelligent and Green Technologies for Sustainable Development", ICITEE 2013. IEEE Computer Society; 2013. p. 25-30.
33. Kurniawan MF, Harbianto D, Siswoyo BE, Susilo D, Trisnantoro L, Ernawaty, et al. Analisis Bottom-Up Pembiayaan Kesehatan di Puskesmas di Provinsi Jawa Timur dan Nusa Tenggara Timur. In: Indonesia Health Economic Association Conference. Bandung; 2014.