



## Secondary Data Analysis of Indonesian Doctors Distribution In 2021

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### ABSTRACT

Health workers are a priority in achieving health development goals. The uneven distribution of doctors has resulted in the low quality of health services in several areas. The purpose of this research is to analyze the distribution of doctors in Indonesia. The research method used in this article is a quantitative descriptive method using secondary data from the 2021 Indonesia Health Profile. The variables in this study are the number of doctors (doctors and specialists) working in Indonesia, the population of each province, population density, percentage of population poor, the number of health centers and the number of hospitals. There is considerable variability in the number of doctors in Indonesia. The highest number of doctors was in West Java Province with 20,226 people. Meanwhile, the lowest number of doctors in West Sulawesi Province was only 380 people. The average number of doctors in each province in Indonesia is 4,311 people. West Java is the province with the highest number of doctors and has the largest population, namely 48,782,400 people. The smallest population is in North Kalimantan Province. The presence of doctors in remote or underdeveloped areas helps overcome the problem of inequality in access to health services. The results of the study concluded that the distribution of doctors in the country was influenced by several factors such as population size, population density, number of hospitals and number of Community Health Centers, which were positively related to the number of doctors.

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#### Kata kunci:

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### ABSTRAK

Tenaga kesehatan menjadi prioritas dalam mencapai tujuan pembangunan kesehatan. Distribusi dokter yang tidak merata menyebabkan rendahnya kualitas pelayanan kesehatan di beberapa wilayah. Tujuan dari penelitian ini adalah untuk menganalisis distribusi dokter di Indonesia. Metode penelitian yang digunakan dalam artikel ini adalah metode deskriptif kuantitatif dengan menggunakan data sekunder Profil Kesehatan Indonesia 2021. Variabel dalam penelitian ini adalah jumlah dokter (dokter dan dokter spesialis) yang bekerja di Indonesia, jumlah penduduk tiap provinsi, kepadatan penduduk, persentase penduduk miskin, jumlah puskesmas dan jumlah rumah sakit. Terdapat variabilitas yang cukup besar pada jumlah dokter di Indonesia. Jumlah dokter terbanyak berada di Provinsi Jawa Barat sebanyak 20,226 orang. Sedangkan, jumlah dokter terendah di Provinsi Sulawesi Barat hanya 380 orang. Rata-rata jumlah dokter di setiap provinsi di Indonesia sebanyak 4,311 orang. Jawa Barat merupakan provinsi dengan jumlah dokter terbanyak yang dan memiliki jumlah populasi terbanyak, yaitu 48,782,400 jiwa. Jumlah populasi paling sedikit terdapat di Provinsi Kalimantan Utara. Kehadiran dokter di daerah terpencil atau tertinggal membantu mengatasi masalah ketimpangan akses pelayanan kesehatan.

Hasil penelitian menyimpulkan bahwa distribusi dokter di dalam negeri dipengaruhi oleh beberapa faktor seperti jumlah penduduk, kepadatan penduduk, jumlah rumah sakit dan jumlah puskesmas, yang berhubungan positif dengan jumlah dokter.

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## INTRODUCTION

Indonesia is a country that has complex and diverse geographical conditions, which cause differences in the level of development and access to health services in various regions. Balanced distribution of human resources can help increase access to quality health services for people in all regions of Indonesia, which can help improve social welfare and sustainable economic development (Misnaniarti et al., 2018). Doctors are health workers who are responsible for providing quality health services, the unequal distribution of doctors can lead to differences in the quality of health services between regions, especially in rural and less developed areas (Hermawan, 2019). Therefore, it is important to ensure an even distribution of doctors in a country.

Several studies have shown that the unequal distribution of doctors can cause public health problems. A study conducted by Singh (2019) found that the lack of specialists in rural areas in India led to disparities in access to health services and lower quality of services compared to urban areas. Another study conducted by Zhu, Hsieh, and Mao (2019) shows that the unequal distribution of doctors in China can lead to disparities in access to health services and lower service quality in rural areas compared to urban areas.

Access to health services in Indonesia is recognized as a significant problem, with large differences between urban and rural areas. Research shows that rural communities in Indonesia have more limited access to health facilities compared to urban communities. Research by Wulandari and Laksono (2019) shows that the opportunity to access health facilities in rural areas in East Java is lower than in urban areas. The results of the same study also show that this limited access is related to transportation problems and long distances to health facilities. Another study by Soewondo et al. (2019) show that health facilities in rural areas of Indonesia generally lack equipment and lack permanent staff.

Geographical and demographic issues impact the doctor-to-population ratio. In addition, it is important to pay more attention to the geographic distribution of essential health services. Difficulties in the distribution of doctors must be addressed with adequate steps and policies, especially during the JKN period. Most health inequalities are explained by the social determinants of health, and the health system is one of them. Human resources are an important component of any national health system and one of the main resource inputs. Several studies have revealed a strong correlation between health outcomes and the concentration of health workers. For example, a study of the global workforce found that population-based health and human survival improved when there was a higher concentration of health workers in a given area (Laksono et al., 2020; Oyola García, 2021; Zhu et al., 2020).

Health workers are prioritized to achieve health development goals. Indonesia's challenge is to increase the number of trained health workers to meet the growing

demand. The Ministry of Health has used a different approach to determining staffing needs through forecasting based on public health conditions, demographic changes, and existing health programs (Hikmah et al., 2020). The uneven distribution of doctors causes the low quality of health services in rural areas. This study aims to analyze the distribution of doctors in Indonesia using secondary data to determine the distribution of medical doctors in Indonesia.

## METHODS

### Participant characteristics and research design

The research method used in this article is a quantitative descriptive method using secondary data from the 2021 Indonesia Health Profile book which can be accessed through the [Ministry of Health of the Republic of Indonesia \(kemkes.go.id\)](https://kemkes.go.id) (Kemenkes RI, 2022). The dependent variable in this study is the number of doctors (general practitioners and specialists) practicing in Indonesia, while the independent variables used are population in each province, population density, percentage of poor people, number of Community Health Centers, and number of hospitals.

### Data analysis

The data used in this study were processed and analyzed to find out the relationship between the dependent and independent variables, to find out the distribution of doctors in Indonesia and to use the Scatterplot to see trends to draw conclusions. The results of this analysis are expected to provide useful information for the government and related parties in increasing the availability of doctors in Indonesia.

## RESULTS AND DISCUSSION

Table 1 shows the descriptive analysis of each variable in the study. This table shows that there is a very large difference in numbers between the distribution of the number of doctors in Indonesia.

Table 1 shows that there is considerable variability in the number of doctors in Indonesia. The highest number of doctors was in West Java Province, namely 20,226 people. Meanwhile, the lowest number of doctors were in West Sulawesi Province, only 380 people. The average number of doctors in each province in Indonesia is 4,311 people. West Java is the province with the highest number of doctors and has the largest population, namely 48,782,400 people. The smallest population is in North Kalimantan Province. Even though West Java has the largest population, the province has the highest population density, but DKI Jakarta Province with a population density of 17,031 people/km<sup>2</sup>. Meanwhile, the least population density is in North Kalimantan Province.

In addition, the descriptive analysis in Table 1 also shows that the average percentage of poor people in Indonesia is 10.42% with the highest percentage in Papua Province, while the lowest percentage is in South Kalimantan Province. Apart from having the lowest population size and population density, North Kalimantan also has the fewest number of health facilities, namely 12 hospitals and 56 health centers. Meanwhile, the highest number of hospitals is in East Java

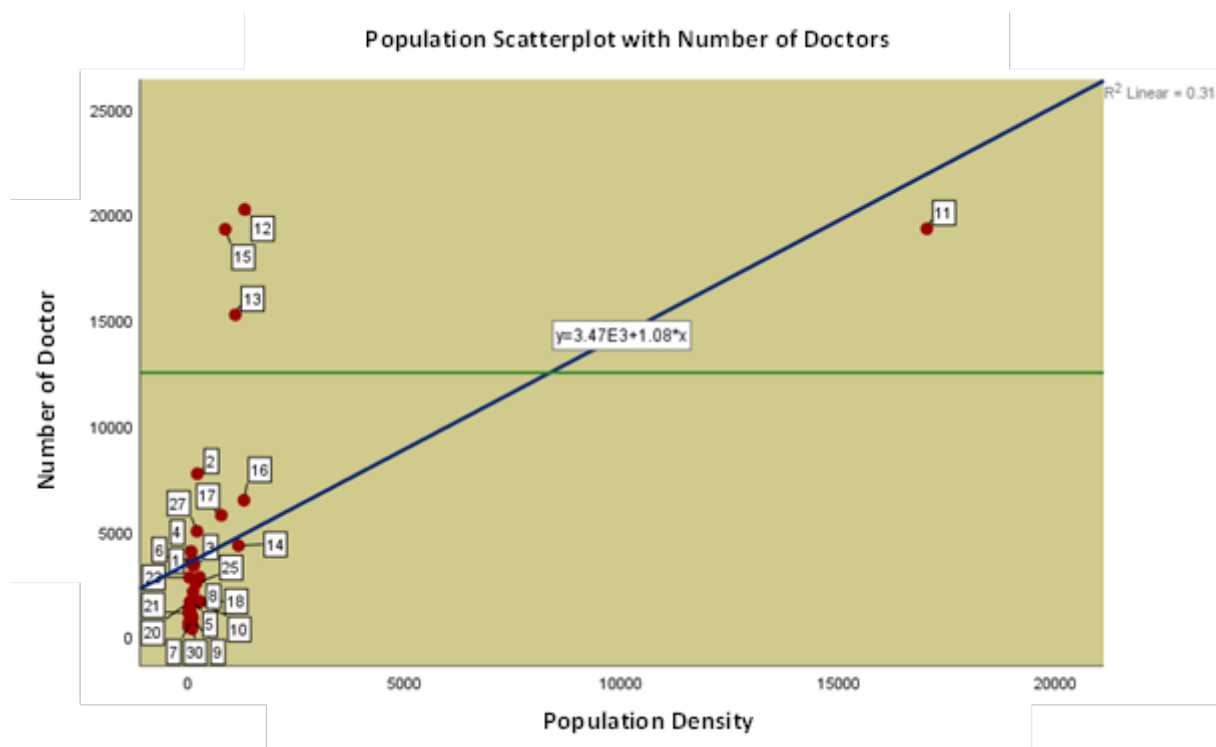
Province. On average, the number of hospitals in Indonesia is 89 hospitals. Along with the highest number of populations, West Java is also the province with the most number of Community Health Centers, namely 1086 Community Health Centers. The average number of Community Health Centers in each province in Indonesia is 303 Community Health Centers.

**Table 1.**  
**Cross Tabulation between Number of Doctors and Population in Every Province in Indonesia**

Variable	N	At a minimum	Maximum	Average	std. Deviation
Number of doctors	34	380	20,226	4,311.38	5,603.56
Number of population (thousand people)	34	713.60	48,782.40	8,020.07	11,377.49
Percentage of poor people (%)	34	4.56	27.38	10.42	5.41169
Population density (people/km <sup>2</sup> )	34	10	17,031	772.82	2,899.26
Number of hospitals	34	12	400	89.47	100.42
Number of health centers	34	56	1,086	302.71	247,345

Scatterplot modeling (Figure 1) between the number of doctors and the population in each province in Indonesia shows a trend of a positive linear relationship. Provinces with a low population category (<1,744,654 people) also have relatively few doctors, namely no more than 1,125 doctors. Meanwhile, the province with the largest population (> 8,690,294 people) has a relatively large number of doctors,

namely more than 2,060 doctors. In fact, 87.5% of provinces with a population of more than 8,690,294 people have more than 3,708 doctors. This indicates that the number of doctors is positively related to the total population in each province. The more population in an area, the more doctors who are interested to work in that area.



**Figure 1.** Scatterplot modeling between the population and the number of doctors in each province in Indonesia.

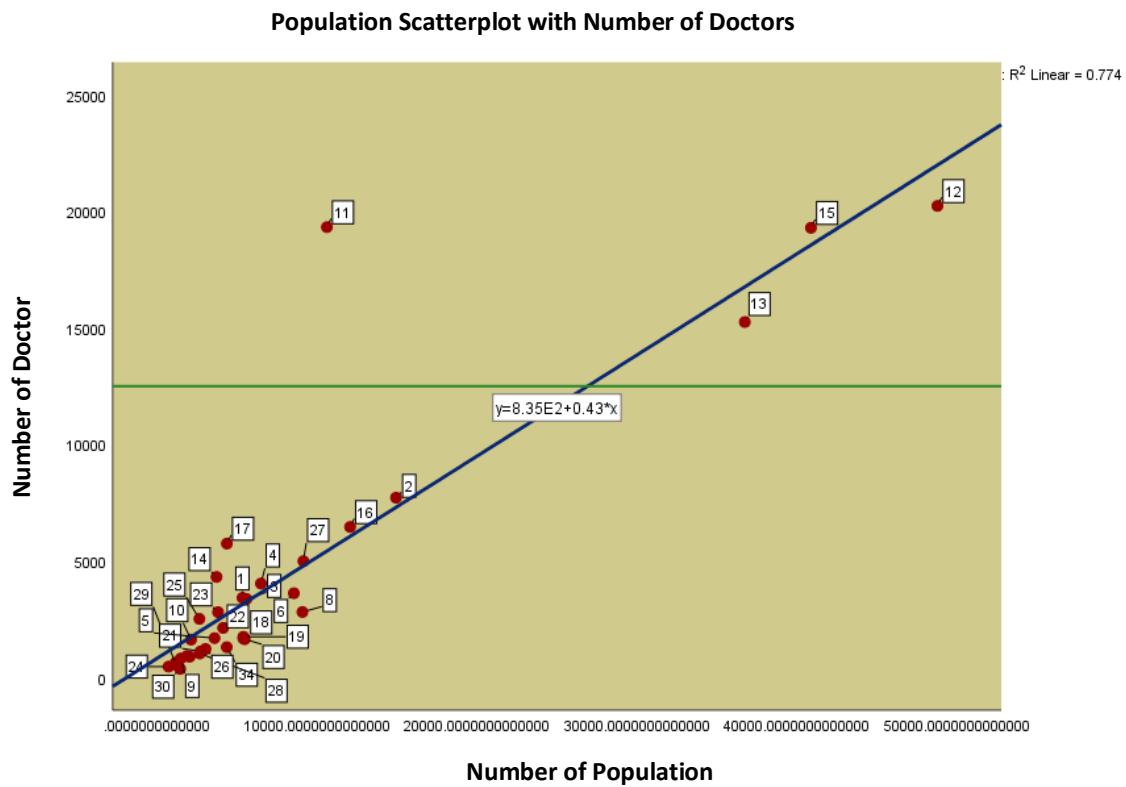


Figure 2. Scatterplot modeling between population density and the number of doctors in each province in Indonesia

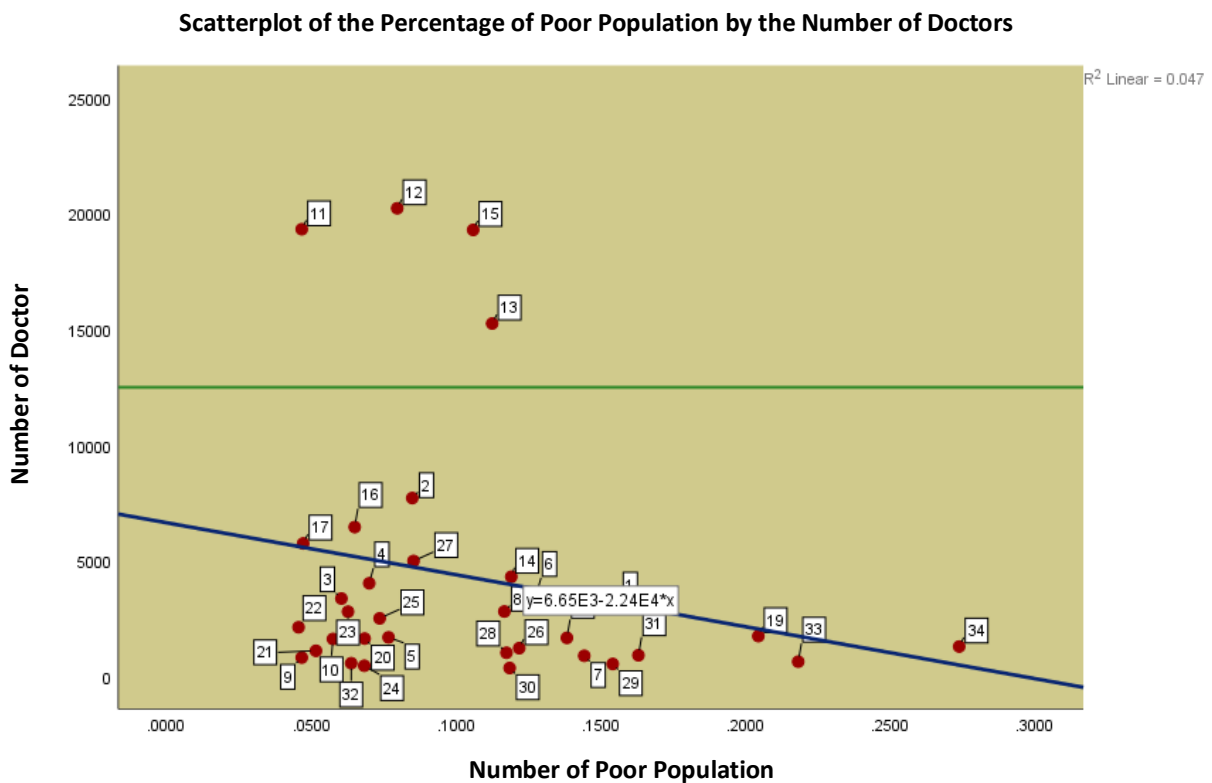


Figure 3. Scatterplot modeling between the percentage of poor people and the number of doctors in each province in Indonesia

The scatterplot modeling (Figure 2) between the number of doctors and population density in each province in Indonesia in the table above shows a trend of a positive linear relationship. Provinces with low population density (less than 37.19 people/km<sup>2</sup>) are dominated by the number of doctors between 1,126 to 2,059 doctors. Meanwhile, the

province with the highest population density (more than 734.69 people/km<sup>2</sup>) has the highest number of doctors in this category, namely more than 3,708 doctors. This illustrates that the number of doctors is positively related to the population density of a province. An increase in occupation density in an area will lead to an increase in the

number of doctors in that area. In other words, doctors are more interested in opening a practice in an area with a dense population.

*Scatterplot* modeling (Figure 3) between the number of doctors and the percentage of poor people in each province in Indonesia shows a *trend* of a negative linear relationship, so it can be interpreted that there is an inverse relationship

between the percentage of poor people and the number of doctors in each province in Indonesia. It is known that the number of doctors in the category of poor people between 7.87% and 11.97% has the highest number of doctors, namely more than 3,708 doctors as much as 66.7%. It can be concluded that the higher the percentage of poor people in an area, the lower the number of doctors in that area.

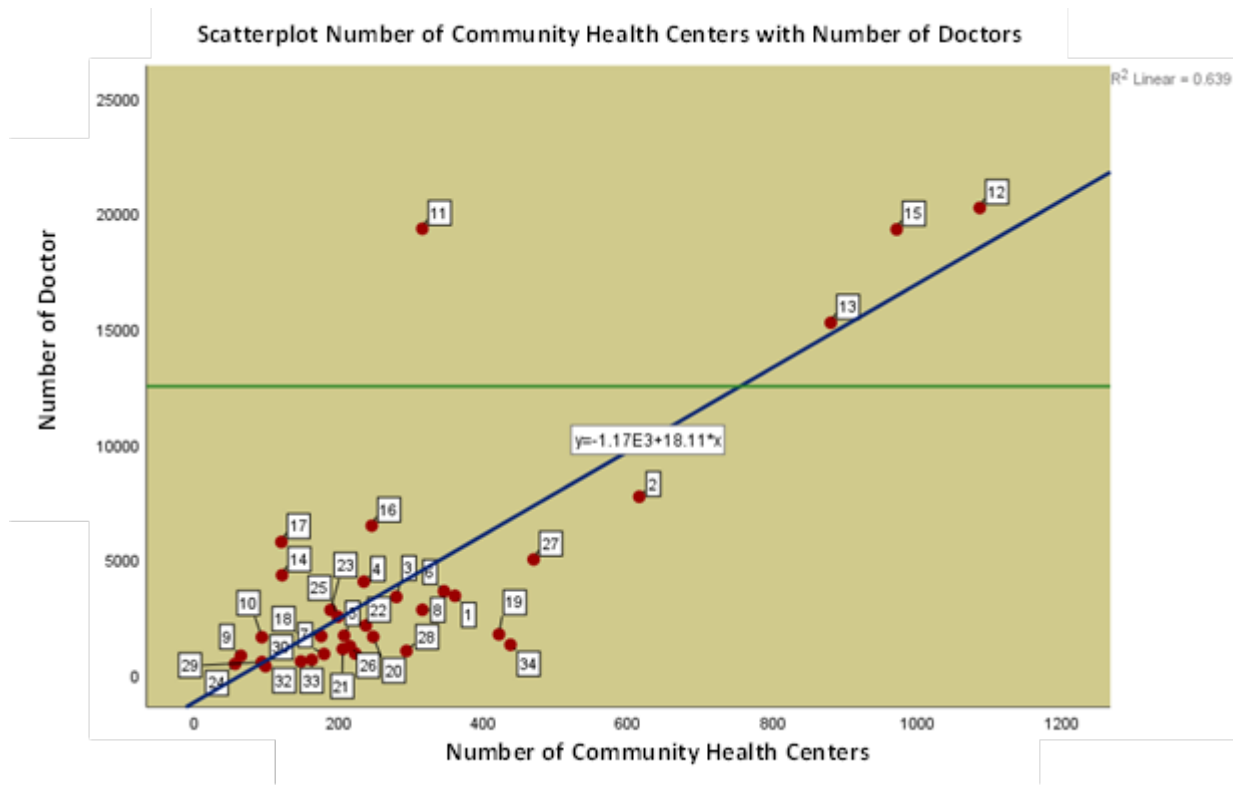


Figure 4. Scatterplot modeling between the Number of Community Health Centers and the Number of Doctors in Every Province in Indonesia

The results of the analysis using the *scatterplot model* (Figure 4) show a *trend* of a positive linear relationship between the number of Community Health Centers and the number of doctors in each province in Indonesia. Provinces with very few health centers (< 121) have the majority of the fewest doctors, namely less than 637 doctors. Meanwhile, for provinces with a very large number of Community Health Centers (> 372), 71.4% of them also have a very large number of doctors, namely more than 3,708 doctors. Thus, the number of doctors is positively related to the number of Community Health Centers in a province. The more Community Health Centers operating in a province, the more doctors working in that province.

Figure 5 shows the *trend* of a positive linear relationship between the number of hospitals and the number of doctors in each province in Indonesia. Provinces with very few hospitals (< 22) also have the fewest doctors, namely less than 637 doctors. Meanwhile, provinces with a very large number of hospitals (> 100) also have a very large number of doctors, namely more than 3,708 doctors. Thus, it can be concluded that the number of doctors is positively related to the number of hospitals in a province. The more hospitals operating in a province, the more doctors working in that province.

Table 2 shows the results of a simple linear regression analysis of the variables studied. The results of the modeling show that the independent variables that are significant to

the dependent variable (number of doctors) are population, population density, number of Community Health Centers, and number of hospitals with a significance value of less than 0.05 ( $\rho < 0.05$ ). There is a significant relationship ( $\rho = 0.000$ ) between the population and the number of doctors with an increase of 1 point in the population will cause an increase in the value of the variable number of doctors by 0.433%. Meanwhile, with a significance value of 0.001 for the population density variable, it indicates that there is an increase in the value of the number of doctors variable by 1,082 for every 1-point increase in population density. In addition, an increase of 1 point in the variable number of Community Health Centers and hospitals will increase the value of the variable number of doctors by 18,112 and 52,500, respectively. B value in the constants row indicates no change in the dependent variable value if there is no change in the independent variable.

*Scatterplot* modeling and linear regression analysis tests show that there are wide variations in the distribution of doctors in each province in Indonesia. Variables that have a *trend* of positive and significant linear relationship to the variable number of doctors are population, population density, number of Community Health Centers, and number of hospitals. Meanwhile, the variable percentage of poor people has a *trend* of negative and insignificant relationship to the variable number of doctors. The results showed that the number of doctors distributed in each province in

Indonesia has a positive relationship with the population size and population density per 100.00 km<sup>2</sup> in a province, as well as the number of health facilities in the form of health centers and hospitals in the province. This is supported by

the results of a simple linear regression analysis test performed on all independent variables. The variable percentage of poor people is the only variable that is not significant to the number of doctors in a province.

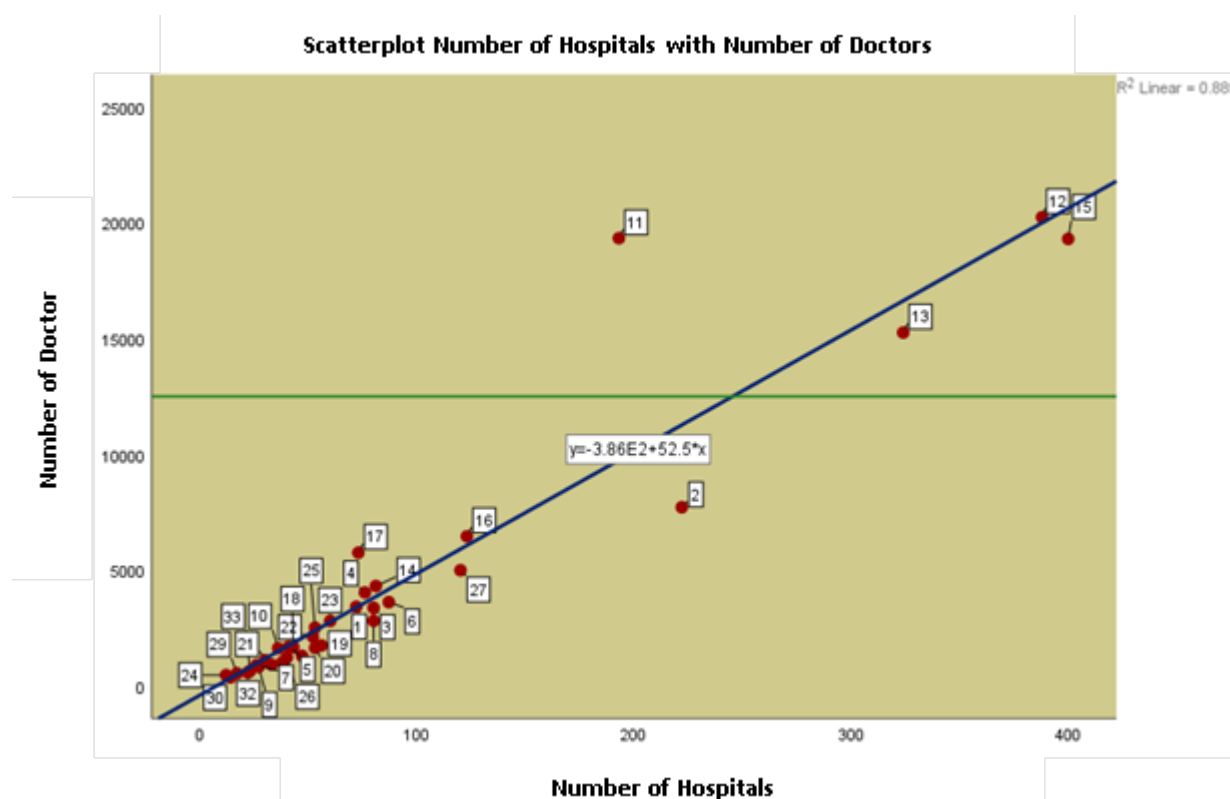


Figure 5. Scatterplot Modeling between the Number of Hospitals and the Number of Doctors in Every Province in Indonesia

Table 2. Test Results of Simple Linear Regression Analysis Independent Variable Against Dependent Variable (Number of Doctors)

Independent Variable	B Values	Significance
Population	0.433	0.000
Constant	835,463	
Population density	1,082	0.001
Constant	3,474,981	
Percentage of poor population	- 22,431,457	0.218
Constant	6,650,389	
Number of Health Centers	18.112	0.000
Constant	- 1,171,150	
Number of hospitals	52,500	0.000
Constant	- 385,796	

The population and population density in a province have a positive relationship with the number of doctors in the province. The more people living in an area, the higher the population density in that area. Murphy et al. (2016) explained in their research that the number of requests for health services is influenced by population, health status, and level of service. One of the variables that can be controlled from health service policy is service level factors, such as access to emergency treatment, fast patient transportation, and availability of emergency vehicles.

Based on the 2021 Indonesia Health Profile, the number of medical personnel throughout Indonesia has reached 173,707 doctors consisting of: 42,319 specialist doctors, 65,406 general practitioners, 3,166 dental specialists, and

23,954 general dentists (RI Ministry of Health, 2022 ). West Java Province has the highest number of doctors of all provinces in Indonesia, while West Sulawesi Province has the fewest number of doctors. This indicates an imbalance of medical personnel in Indonesia. Medical personnel are more widely distributed in the islands of Java and Bali than in eastern Indonesia (Meliala et al., 2013). This can be caused because most areas in Java and Bali have experienced urbanization. Inequality in the distribution of medical personnel in a country and the retention of health workers in rural and underdeveloped areas is caused by several factors, including: social factors, economic factors, health system factors, human resource development factors, geographic and demographic factors, professional factors, work

conditions factors and life, cultural factors, personal factors, as well as the process of urbanization and associated health risks (Hasan et al., 2020; Mohammadiaghdam et al., 2020; Obubu et al., 2023; Siripanumas et al., 2022; Wibulpolprasert & Pengpaibon, 2003).

The results of this analysis are supported by research conducted by Winkelmann, Muench, and Maier (2020) and Obubu et al. (2023) which shows that the density of doctors in densely populated areas, such as capitals and agglomerations, tends to be higher. These areas generally have higher attractiveness in terms of transport infrastructure, career partners, recreational opportunities, access to and availability of educational and childcare facilities, and higher *prestige job opportunities*. In addition, the reasons medical graduates do not choose to work in rural areas are the lack of opportunities for professional development and potential for promotion, the absence of social life in the city, and the lack of job satisfaction; as well as poor working conditions, political and ethical issues, and poor security (Hou et al., 2016). Availability of opportunities to develop education and skills is one of the factors of satisfaction for medical personnel. Medical graduates choose to work in urban areas or continue their education due to social and economic factors, family, more promising career prospects than working in rural or rural areas, geographical location, and remuneration (Hou et al., 2016; Zhu et al., 2019). Medical graduates have been educated for many years and must develop their skills in work. This requires planning in the field of education. Raising the local education level may be a useful strategy to address the uneven distribution of doctors, particularly in rural areas where the dearth of medical doctors is a serious problem (Matsuura et al., 2021). Additional policies that address the main issues brought up by stakeholders should also be included, as should enhanced procedures for coordination, accountability, and transparency (Sriram et al., 2021). Prior research discussed the significance of choosing students from rural origins to serve as medical professionals in neglected communities (George et al., 2019).

The Strategic Plan of the Ministry of Health of the Republic of Indonesia for 2015–2019 states that the Government of Indonesia has a target ratio of health workers to the population as follows: general practitioners 48/100,000 population; nurses 158/100,000 population; and midwives 75/100,000 population (Ministry of Health of the Republic of Indonesia (Kemenkes RI), 2015). The ratio of midwives and nurses was fulfilled in 2013 with the rate of 75.94 midwives/100,000 population and 157.88 nurses/100,000 population, but the condition for adequacy of doctors has not been met with a rate of 21.63 doctors/100,000 population. The large disparity in comparison between working health workers and the large population in rural areas indicates an increase in patient waiting time and staff workload, resulting in poor service delivery effectiveness (Obubu et al., 2023).

Based on *the indirectness competitiveness theory* developed by Joseph P. Newhouse, which states that by increasing competition in an environment where there are low and regulated prices, and patients do not bear any costs for the services performed, it will encourage an increase in the number of doctors in the region (Dzampe & Takahashi, 2022). In accordance with this research, it can be concluded that by increasing the number of doctors in an area, it will reduce geographic disparities in the distribution of doctors because it will increase the number of practitioners in rural areas.

Demographic factors include personal factors that influence the willingness of medical personnel to work in underdeveloped and rural areas. The tendency of male medical personnel to work in rural areas is greater than that of female medical personnel (Mohammadiaghdam et al., 2020). This could be because female medical personnel have greater concerns related to working conditions, such as security, family responsibilities, living conditions and other considerations (Mollahaliloglu et al., 2015). According to Hou et al. (2016), equitable distribution of medical personnel can be done by providing opportunities for people with rural backgrounds to enroll in medical study programs. This is because there is a tendency for graduates who come from rural areas to work and return to areas that are also rural (Hou et al., 2016). A sense of empathy and a desire to serve people in rural and underdeveloped areas can also be categorized as personal factors. The experience of difficulties in accessing health services in rural areas can create a sense of empathy and balance the desire for appreciation and good career prospects.

The percentage of poor people in each province is negatively related to the number of doctors in that province. The results of this study are in line with the study conducted by Laksono, Ridlo, and Ernawaty (2020). Community poverty is closely related to per capita income in the region (Fadlillah, 2016). One indicator of community prosperity in an area is per capita income where the higher the community's income, the more prosperous the community is. The high level of income per capita is the strongest cause of increased expenditure in the health sector due to increased public awareness of the importance of health (Yan, 2022). Increased public awareness of the importance of health affects the increase in the development of health facility infrastructure and *the demand* for health workers in an area. This causes medical personnel, including doctors, to tend to choose to work in areas with high per capita income levels, or areas with a low poverty percentage. In addition, economic factors, especially the incentives received by doctors after providing health services, are one of the factors causing the tendency of doctors to choose not to work in areas with a high percentage of population poverty.

The number of health facilities in the form of health centers and hospitals in one province is positively related to the number of doctors in that province. The study conducted by Al-Dabbagh, Sulaiman, and Abdulkarim (2022) reports that there is inequality in the distribution of doctors, which is partly due to the absence of referral hospitals for the Community Health Centers and the remote location from the Bardarash region. In addition, the Community Health Centers in this area have a higher number of visits from the community for medical advice and other preventive programs. The findings from this study raise interest in developing a *skills-mixing plan* to shift some of the assigned duties of medical doctors to other mid-level healthcare professionals. *Skill-mixing* can substantially address staff shortages in some areas, and when understaffed staff are replaced by lower-cost categories of staff, the costs of providing healthcare will be controlled.

## CONCLUSIONS AND SUGGESTIONS

The distribution of doctors in every province in Indonesia has a positive relationship with the total population and population density per 100.00 km<sup>2</sup> in a province, as well as the number of health facilities in the form of health centers

and hospitals in that province. This is supported by the results of a simple linear regression analysis test performed on all independent variables. The variable percentage of poor people is the only variable that is not significant to the number of doctors in a province.

The presence of doctors in remote or underprivileged areas will help overcome the problem of inequality in access to health services. From the research results, it was found that several factors influenced the distribution of doctors in the country, such as population size, population density, the number of hospitals, and the number of health centers which were positively related to the number of doctors.

The government can make policies to equalize the distribution of doctors in Indonesia. One of the policies that can be implemented is to provide educational programs for specialist doctors and general practitioners with the support of scholarships and other incentives. In addition, the government has also implemented a doctor placement program supported by financial and non-financial incentives, to increase the number of doctors available in rural and remote areas. The government is also improving health facilities in rural areas and remote areas, so as to increase people's access to quality health services. These policies are expected to assist the government in increasing the equitable distribution of doctors throughout Indonesia and increasing people's access to quality health services.

## ETHICAL CONSIDERATIONS

### Funding Statement.

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### Conflict of Interest Statement

There is no conflict of interest.

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