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Mapping the Efficiency of Health Services in Indonesia to Mitigate Scarring Effect Due to the Covid-19 Pandemic

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Abstract

The purpose of this article is to map the efficiency of health services in Indonesia before the Covid-19 pandemic (2017-2018) and during the pandemic (2019-2021). The analytical method used is Data Envelopment Analysis (DEA) using Banxia Frontier 3 software. This relative efficiency measurement covers provinces in Indonesia. The input variables used are the number of Public Health Centers, the number of hospitals, the number of medical personnel at public health centers, the number of medical personnel in hospitals and the realization of deconcentration funds in the health sector per province in Indonesia. The impact of the pandemic due to Covid-19 has the potential to cause a scarring effect in the future, so the need to mitigate the scarring effect of the covid pandemic on the national economy is urgently needed not only by developed countries, but developing countries like Indonesia. The health sector is urgently needed, especially during the Covid-19 pandemic. The readiness of the health sector in dealing with patients is urgently needed. The performance of health services in Indonesia, as shown by the efficiency of health services in Indonesia, is still inefficient. This article maps the efficiency of health services before and during the Covid-19 pandemic, so that we can see the readiness of health services to handle the Covid case. This is important to mitigate the scarring effect so that the national economy recovers.

Keywords: efficiency, health services, Data Envelopment Analysis (DEA), scaring effect.

1. INTRODUCTİON

The world is now beginning to recover from the effects of the Covid-19 pandemic that has ravaged the world. However, Bank Indonesia also stated in its February 17, 2022 press

release that the COVID-19 pandemic has left a devastating impact on the global economy, including Indonesia (Haryono, 2022). Doleschel and Manu (2021) also recalled that this pandemic still poses long-term risks to future production.

Not long ago, as part of the G20 Presidency, Member States' Finance Ministers and Central Bank Governors developed several strategies to overcome the possible negative impacts of the pandemic. One is to help strengthen health systems in preparation for the next pandemic (BKF-Ministry of Finance-RI, 2022). This is important given that the COVID-19 pandemic in Indonesia itself shows that the Indonesian healthcare sector is unprepared for a pandemic.

The Global Health Security Index (GHS Index) which assesses the health sector in many countries reports that in 2021 Indonesia will experience a decrease in the prevent indicator (by -3.4 points) which measures efforts to prevent the emergence of pathogens, and in the response indicator (by -10, 2 points) which measures how quickly the health sector responds and mitigates the spread of the epidemic. In addition, as of 30 December 2020, Indonesia`s fatality rate was 2.89%, a year later, 30 December 2021 to be exact, the case fatality rate had increased to 3.38% (Ritchie et al., 2022). This data shows clearly that during the pandemic, the health sector in Indonesia was very weak in terms of responsiveness and preventive measures.

Data on Indonesian life expectancy growth have remained stagnant at the 0.25% level since 2019 (www.macrotrends.net, 2022). This growth rate has decreased compared to the previous year. It was noted that the growth rate reached 0.39% in 2018 and 0.4% in 2017. Given the positive and strong association between health infrastructure and life expectancy (Kristanto et al., 2019), stagnating life expectancy fails to significantly improve health sector performance. may indicate.

Efforts to improve public health must be supported by governments through the allocation of government spending (Lu et al., 2010). At least this government spending can be used to improve the infrastructure and performance of Indonesia's health services. The allocation of government spending to the health sector is currently set at a minimum of 5%. Improving healthcare performance and mitigating the potential scarring effects of the pandemic requires more attention to the efficiency principle of government spending. High efficiency allows government spending to be calculated as accurately as possible according to goals.

Studies on the efficiency of health services have been conducted in several countries, for example by Şahin et al. (2021) in Turquie, Yaya et al. (2020) China, Sinimole (2012) World Health Organization (WHO) Member States, Singh et al. in ASEAN Member States (2021). There is also a study by Paul et al. on issues of efficiency and equity in health care systems. (2022) and a study by Troisi et al. (2022) On the impact of organizational flexibility on hospital efficiency in providing medical services to COVID-19 and non-COVID-19 patients. Other studies have measured the efficiency of health services during pandemics, such as Akinwale and Kuye (2022), Lupu and Tiganasu (2022), and Kamel and Mousa (2021).

None of the various studies mentioned above measured the efficiency of Indonesian health services before and during the pandemic. Therefore, this study focuses on the study of health service efficiency in Indonesia, focusing on health service efficiency at the Indonesian state level before and during the pandemic. It is hoped that this mapping will help the Indonesian government mitigate the scars of the pandemic and prepare it to deal with other pandemics that may occur in the future.

2. METHOD

This study uses DEA (Data Envelopment Analysis). DEA is a mathematical technique for evaluating the relative efficiency and optimal performance of a set of decision engines. The DEA evaluates decision-making units, or calls itself DMUs (Decission Making Unit). Each DMU consists of a set of inputs and outputs. Unit performance is determined by set production limits. Efficiency values range from 0 to 1. A value of 1 indicates that the unit is efficient, other values indicate that it is inefficient (Balf et al., 2021; Charnes et al., 1978).

The assumptions used in this study are based on Banker, Charnes, and Cooper's 1984 VRS. When the additional input is given x times, the output is produced either increased or decreased compared to the additional input (Banker et al., 1984).

A DEA analysis requires inputs and outputs. The input of this study is the number of hospitals, the number of public health centers, the number of doctors and nurses in hospitals, the number of doctors and nurses in public health centers, the realization of health dispersion funds, and the result is life. Expected rate (AHH). The selection of input and output variables is relevant for research (Pelone et al., 2015). Data collected are secondary data from the Indonesian Ministry of Health (Kemenkes-RI, 2018, 2019, 2020, 2021, 2022). The DMU in this study are all provinces of Indonesia. Years of analysis are 2017 to 2021. The years 2017-2019 represent events before the Covid-19 pandemic, and the years 2020-2021 represent events after the Covid-19 pandemic.

The model used is formulated as follows:

Maximize: $E_k = \sum_{r=1}^{s} u_{rk}.Y_{rk}$ (1)

With limitations or constraints:

$$\sum_{r=1}^{s} u_{rk}.\ Y_{rj} - \sum_{i=1}^{m} v_{ik}.\ X_{ij} \leq 0; j = 1, \dots, n \quad (2)$$

$$\sum_{i=1}^{m} v_{ik}.\ X_{ik} = 1 \quad (3)$$

$u_{rk} \geq 0$; r = 1, ..., s (4)

$v_{ik} \geq 0$; i = 1, ..., m (5)

Where:

Yrk : total output r (AHH) of the province

Xij : number of inputs i (number of hospitals, number of public health centers, number of doctors and nurses in hospitals, the number of doctors and nurses in public health centers, realization deconcentration funds for health) required by the province.

Yrj : total output r (AHH) of the province.

Xik : number of inputs i (number of hospitals, number of public health centers, number of doctors and nurses in hospitals, the number of doctors and nurses in public health centers, realization deconcentration funds for health) required by the province.

s : the number of provinces analyzed.

m : the number of inputs used.

urk : weighted weight of output r produced by each province.

vik : weighted weight of input i used by each province.

Ek : optimized value as an indicator of the relative efficiency of each province.

3. RESULTS

This study uses Banxia Frontier Analyst 3 to analyze the efficiency of the health care system in Indonesia. Observations were conducted in all provinces of Indonesia, the observation years were from 2017 to 2021, and the summary of the analysis results is as follows.

Table 1 Efficient Province During Observation

Year	Province
2017	West Sulawesi, West Papua, Gorontalo, North Kalimantan, East Kalimantan, Yogyakarta
2018	West Papua, North Kalimantan, East Kalimantan, Yogyakarta
2019	West Papua, West Kalimantan, North Maluku, Jakarta, Bangka Belitung Islands, North Kalimantan, East Kalimantan, Yogyakarta
2020	West Sulawesi, Gorontalo, Maluku, Southeast Sulawesi, Bali, North Kalimantan, East Kalimantan, Yogyakarta
2021	West Sulawesi, Bangka Belitung Islands, Jakarta, North Kalimantan, East Kalimantan, Yogyakarta

Based on observation years, the three provinces that consistently achieve efficiency are North Kalimantan, East Kalimantan and Yogyakarta. The number of efficient states is less than the number of inefficient states. There were 34 states observed, but only about 4 to 8 states were efficient, or about 12% to 24%. Efficiency improvements for all states are shown in Table 2 below.

Table 2 Efficiency Achievements of All Provinces in Indonesia 2017-2021 (%)

Provinsi	2017	2018	2019	2020	2021
Aceh	93.53	93.7	93.77	93.79	93.52
North Sumatra	91.48	91.7	92.06	92.17	92.27
West Sumatra	92.95	92.46	93.12	93.31	93.12
Riau	96.22	95.54	96.35	96.56	96.25
Jambi	96.61	96.35	96.42	96.71	96.82
South Sumatra	93.1	92.96	93.46	93.57	93.47

Bengkulu	94.39	94.41	95.02	95.2	95.17
Lampung	95.01	94.63	94.7	95.27	95.02
Bangka Belitung Islands	96.3	96.53	100	97.1	100
Riau Islands	95.36	95.16	95.48	95.57	95.79
Jakarta	97.1	97.16	100	99.84	100
West Java	96.96	97.13	97.3	97.5	97.74
Central Java	99.1	99.13	99.07	99.17	99.25
Yogyakarta	100	100	100	100	100
East Java	94.65	94.78	95.04	95.09	95.14
Banten	92.99	93.09	93.26	93.31	93.33
Bali	96.36	96.49	96.39	100	96.32
West Nusa Tenggara	89.58	89.71	89.95	90.29	90.48
East Nusa Tenggara	90.55	90.62	91.85	91.73	91.04
West Kalimantan	95.46	95.49	96.26	96.52	96.26
Central Kalimantan	95.75	95.5	95.38	95.35	95.56
South Kalimantan	92.54	92.61	92.69	93.02	93.19
East Kalimantan	100	100	100	100	100
North Kalimantan	100	100	100	100	100
North Sulawesi	96.84	96.76	97.21	97.18	96.77
Central Sulawesi	92.37	92.6	93.44	93.95	93.9
South Sulawesi	93.51	93.73	94.11	94.13	94.18
Southeast Sulawesi	97.05	97.02	97.51	100	97.63
Gorontalo	100	93.02	93.76	100	93.83
West Sulawesi	100	89.1	100	100	100
Maluku	93.26	90.42	95.32	100	90.54
North Maluku	93.21	93.22	100	97.87	94.25
West Papua	100	100	100	91	91.05
Papua	89.35	89.46	90.08	90.21	89.8
Average	95.34	94.72	95.85	96.04	95.34

Table 2's breakdown of the number of provinces with efficiency levels above the national average reveals that in 2017, there were 18, in 2018, there were 17, in 2019, there were 15, in 2020 there were 17, and in 2021 there were 15 provinces. This demonstrates the

need for further improvement in Indonesia's healthcare system. According to study Mahmood et al. (2018) and Pratono and Maharani (2018), this situation exists.

Fast health treatments are necessary for a healthy existence that has been disrupted by a sickness like Covid-19. Since March 2020, Covid-19 has been classified as a pandemic by the WHO (Padhan and Prabheesh, 2021). This virus has spread throughout the entire world. According to the most recent WHO data, which was posted on the covid19.go.id page as of October 2, 2022, Covid-19 has spread to 234 nations, with a total of 614,385,693 confirmed cases and 6,522,500 fatalities.

Covid-19 is a unique occurrence that needs to be dealt swiftly to prevent the death toll from rising. Many patients are being underserved as a result of the Covid-19 pandemic's unpreparedness among health providers in developing countries (Olufadewa et al., 2021). As one of the nations that was likewise shocked by the Covid-19 outbreak, Indonesia is working to reform its healthcare system (Malahayati et al., 2021).

The quality of human life would be enhanced by good health services. Life expectancy is a parameter used to assess a population's health (Megyesiova and Lieskovska, 2018; Miladinov, 2020; Sharma, 2018). A healthy and successful life is the third of the SDGs, and the longer life expectancy is in line with this target (Megyesiova and Lieskovska, 2018; Pereira et al., 2021). The life expectancy in 2020 for Indonesia is 72.32, placing it 122nd overall and 6th among ASEAN nations.countries.

Government funding, easily accessible facilities, and an adequate staffing level all contribute to the improvement of health care (Mahendradhata et al., 2017). The achievement of the deconcentration funding for health is one of the inputs utilized in the DEA analysis. WHO figures show that Indonesia spends less on health care than other nations (Mahendradhata et al., 2017).

The burden on the government increased during the Covid-19 pandemic. Indonesia's economy has slowed down due of social exclusionary measures taken to stop the spread of Covid-19 (Sparrow et al., 2020; Thu et al., 2020; Thunström et al., 2020). The ratio of the health budget to the overall state expenditure from 2017 to 2021 is 4.6%, 4.9%, 4.9%, 5.2%, and 6.2%, respectively, according to statistics from the DPR RI Budget Study Center. The budget for the health sector in Indonesia has not been fully realized. It is only 32.2% of the budget ceiling, according to the Indonesian Ministry of Health, which was described by the DPR PI Budget Study Center, to cope with Covid-19 and national economic recovery (Andini and Agustiani, 2021).

Spending for healthcare during the Covid-19 outbreak was IDR 87.5 trillion. In lieu of Law Number 1 of 2020 Concerning State Financial Policy and Financial System Stability for Handling the Corona Virus Disease 2019 (COVID-19) Pandemic and/or In the Context of Facing Threats that Endanger the National Economy and/or Financial System Stability, Law Number 2 of 2020 Concerning Stipulation of Government Regulation in Lieu of that Law specifies the budget amount. However, the BPKP study indicates that local governments took longer than expected to absorb the COVID19 health funding (Syaputri, 2022).

Additionally, the quantity of health services in Indonesia is insufficient and budget realization has fallen short of expectations. The availability of healthcare facilities affects a nation's level of public health. A health service facility is a device and/or location used to carry out health service efforts, whether promotional, preventive, curative, or rehabilitative, carried out by the government, regional government, and/or the community, according to Law Number 36 of 2009 concerning Health. Indonesian health care is not dispersed equally, though. Hospitals and community health clinics are considered health service facilities under Government Regulation Number 47 of 2016 regarding Health Service Facilities.

The distribution of health services in Indonesia is not equitable, particularly for people living in the Eastern part of the country (Pratiwi et al., 2021). In addition to providing inconsistent services, Indonesia lacked enough referral hospitals to handle the Covid-19 outbreak. Covid-19 patients are too many for referral hospitals to handle (Andini and Agustiani, 2021).

The standard of health care offered to the general public is also influenced by medical professionals (health human resources), in addition to medical infrastructure. The island of Java is where the majority of health personnel are located (Ministry of Health-RI, 2018, 2019, 2020, 2021, 2022). When compared to the population and the number of disasters that occur in each province, the availability of medical personnel in Indonesia is still uneven and insufficient (Kusumawardani et al., 2016).

The effectiveness of Indonesia's health services needs to be increased, per the findings of the DEA analysis shown in Table 2. The average efficiency gains following the Covid-19 epidemic, which was depicted in 2020–2021, were nearly identical to the average efficiency increases prior to the pandemic. It is necessary to remove the Covid-19 pandemic's scarring or bruising effects. Nourishing the community is one strategy for recovering from the scarring impact (Cerra et al., 2021; Ministry of Finance-RI, 2022).

4. CONCLUSİON

The findings of the DEA analysis indicate that provinces in Indonesia need to increase the effectiveness of their health services during the observation year. All stakeholders face a challenge as a result of this situation in terms of improving their health services. The lack of Covid-19 referral hospitals, the concentration of medical professionals in particular regions, and the underutilization of the health budget have all contributed to the Covid-19 pandemic's transformation into a catalyst for reform. The number of hospitals that are easily accessible to the entire community, the number of medical professionals who are sufficient and dispersed across all regions of Indonesia, and the absorption of the health budget are all initiatives that must be addressed in order to create a healthy society, particularly to heal the scarring effect of the post-Covid-19 pandemic.

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