OPTIMIZATION OF HEALTHCARE WORKERS AVAILABILITY: INCREASING PRIMARY HEALTHCARE EFFICIENCY IN INDONESIA

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Abstract
Policy has focused on the unequal distribution of health workers, while the potential for improvements in efficiency to address this problem has been neglected. This study aims to measure and compare the level of efficiency in the use of the available health workforce for the delivery of selected primary healthcare services among districts/cities in Indonesia, and to identify factors influencing that efficiency. The Data Envelopment Analysis method with output orientation to measure efficiency and Tobit regression analysis was performed to determine the effect of contextual factors. The average score for the technical efficiency of primary health care service delivery throughout Indonesia was 1.29, indicating the potential to achieve on average 29\% higher coverage of the selected primary health services if all were as efficient as the most efficient. The average efficiency score in the Eastern Indonesia region was 1.62 and the average in the Java-Bali region was 1.05, indicating higher potential efficiency gains in the Eastern Indonesia region. Access to health care facilities was a consistently significant factor influencing the efficiency of primary health care in almost all regions. This study has demonstrated the potential for significant gains in coverage of key primary care services through improvements in the efficiency of use of the existing health workforce.

Keywords: Health Workers, Primary Health Care, Efficiency, Data Envelopment Analysis

Abstrak
Kebijakan terfokus pada ketimpangan distribusi tenaga kesehatan, di sisi lain potensi peningkatan efisiensi untuk mengatasi permasalahan ini masih diabaikan. Penelitian ini bertujuan untuk mengukur tingkat efisiensi atas penggunaan tenaga kesehatan yang tersedia untuk pelayanan kesehatan terpilih di layanan kesehatan primer di antara kabupaten/ kota di Indonesia, dan mengidentifikasi faktor yang mempengaruhi efisiensi. Metode Data Envelopment Analysis dengan orientasi output untuk mengukur efisiensi dan analisis regresi Tobit digunakan untuk menentukan efek dari faktor kontekstual. Rerata skor efisiensi teknis pelayanan kesehatan primer di seluruh Indonesia sebesar 1,29, mengindikasikan potensi untuk mencapai 29\% cakupan layanan lebih luas atas layanan terpilih di fasilitas kesehatan primer jika seluruhnya bekerja secara efisien sebagaimana fasilitas yang paling efisien. Rerata efisiensi di regional Indonesia Timur adalah 1,62 dan rerata di Jawa Bali sebesar 1,05, mengindikasikan peningkatan potensi efisiensi di regional Indonesia Timur. Diantara ketiga faktor kontekstual yang diuji, factor akses terhadap fasilitas pelayanan kesehatan yang konsisten bermakna signifikan terhadap efisiensi pelayanan kesehatan primer di hampir semua regional. Studi menunjukkan potensi peningkatan secara signifikan atas cakupan layanan kesehatan primer melalui peningkatan efisiensi penggunaan tenaga kesehatan yang tersedia.

Kata Kunci: Tenaga kesehatan, Pelayanan Kesehatan Primer, Efisiensi, Data Envelopment Analysis
INTRODUCTION

Health workers in primary health care, particularly in the public sector, have an important role in providing health care services. However, the availability of health workers varies across the country. This impacts the performance of primary health services in various regions (Mustara and Purwaningrum 2018). As a result of the unequal availability of health workers, populations in rural and remote areas experience a higher prevalence of various health problems that could be prevented compared to people in urban areas. The health issues include infectious diseases, childbirth complications, and higher maternal and child mortality rates (Salafsky, Glasser, and Ha 2005). With the limited resources of health workers in various regions of Indonesia, it is necessary to evaluate the performance of health services using optimization techniques to create benchmarks to provide information on how to improve the performance of health services.

The distribution of health care workers plays an essential role in delivering health services in developing countries. The limited number of skilled health workers in developing countries is often seen as a critical barrier to achieving the health-related SDGs targets (World Health Organization 2016). The World Health Organization (WHO) estimates that the global need-based health workforce shortage in 2013 reached 17.4 million people (World Health Organization 2016). Data managed by Human Health Resources Development and Empowerment Body/ Badan Pengembangan dan Pemberdayaan Sumber Daya Manusia Kesehatan (BPPSDMK) shows that the number of healthcare workers in Indonesia in 2018 was 1,182,808 people. However, the highest proportion of health workers was nursing personnel, 40% of the total health workers. Most of the health workers are distributed in Java. At the primary health care level, more than 25% of facilities lack a doctor, especially in the Eastern part of Indonesia. On the other side, ten provinces have more doctors than standard. Therefore, it is crucial to measure the efficiency of health facilities in using the available health care workers to deliver key primary health services and to estimate the potential gains in service coverage if the available workers work more efficiently.

Health workers have an important role in increasing access and quality health services for the community. They provide essential services in promoting health, preventing disease, and providing health care services to individuals, families, and communities based on a primary health care approach (Republik Indonesia 2009, 2012). Primary health services must include eight essential elements, namely: education on disease prevention and control; increasing food supply and improving nutrition; provision of clean water and basic sanitation; maternal and child health services (including family planning); immunization against infectious diseases; prevention and control of locally endemic diseases; treatment of common diseases and trauma; and supply of essential medicines (World Health Organization 1978). Following the agenda to achieve the 2030 Sustainable Development Goals, The Astana Declaration in 2018 emphasizes the importance of the availability of health workers, especially in primary health facilities in rural, remote and disadvantaged areas (World Health Organizations 2018). In Indonesia, the Ministry of Health regulates the adequacy of health workers in public primary health care (Kemenkes 2014). The regulation state that primary health care needs at least doctors, dentists, nurses, midwives, public health workers, environmental health officers, medical laboratory technicians, nutritionists, and pharmacists. However, due to the scarcity of health workers, the Ministry of Health regulates the additional role and competence of health workers in remote areas. Studies found a significant correlation between the number of health workers and the level of immunization coverage, and coverage of assisted delivery by health care workers (Kruk et al. 2009; Mitchell et al. 2008). In 2018, immunization coverage in Indonesia was below the national target (58% out of 93%). In addition, on average 86% of deliveries were assisted by health workers, yet 17 provinces did not achieve the national target.

Given the scarcity of health workers, evaluating the efficiency of the use of health care workers to achieve desired levels of coverage of key primary health care services is
needed to ensure the optimal use of health workers in delivering primary health care. Lack of efficiency studies in Primary care and developing countries (Hafidz, Ensor, and Tubeuf 2018; Hollingsworth 2008). Therefore, this study aims to measure the technical efficiency of primary health care services in achieving coverage of key primary health services with the available health care workers across the districts/cities in Indonesia and to identify contextual factors that influence the level of efficiency.

METHODS

In general, the definition of efficiency is maximizing the outcome (output) obtained from the input (Rokx et al. 2009). Efficiency analysis aims to explain the variations that occur and explain how certain health care providers or health systems perform better than others (Joint Learning Network for Universal Health Coverage 2020).

In the context of developing countries, Data Envelopment Analysis (DEA) is the most frequently used efficiency analysis technique in all regions globally. This is because DEA has many advantages because it is able to handle many inputs and outputs and does not require a certain functional form so that it is more flexible (Hafidz, Ensor, and Tubeuf 2018). Considering that policy makers need fast, clear, simple and practical evidence and the limited availability of routine health financing data, in this study the authors conducted an efficiency analysis using the DEA method. The strength of DEA is that it does not require specification of the specific components that contribute to efficiency. It merely compares the outputs achieved with the nominated inputs. However, this does mean that DEA does not provide specific policy guidance on how to improve efficiency. It indicates the potential gains that could be achieved if all units operated at the level of efficiency of the most efficient. In addition, DEA measurements can be influenced by extreme outliers (Coelli et al. 2005; R. Jacobs, Smith, and Street 2006).

The DEA method can identify the performance of health facilities by comparing (benchmarking) with fully efficient health facilities, namely health facilities that are on the frontier line. Both input and output-oriented approaches use the number one (1) to indicate the most efficient health facility. Inefficiency in the input-oriented model is indicated by a value of less than 1, while in the output-oriented model, inefficiency is indicated by a value of more than 1 (Cooper, Seiford, and Zhu 2004).

The DEA frontier line differs depending on the assumptions regarding scales used. In general, there are two assumptions, namely constant return to scale (CRS) and variable return to scale (VRS). CRS is used if a health facility can increase the output they produce proportionally (linearly) if they add input. Meanwhile, VRS can be more flexible, meaning that the increase in output is not always proportional to the increase in input, and often according to what happens because a health facility is subject to financial, regulatory, and other constraints that cause them to operate sub-optimally.

We applied a two-stage data envelopment analysis (DEA) method and the output-oriented model to measure the distribution of efficiency in achieving key primary health care objectives across districts of Indonesia. The first stage measures the efficiency of the proportion of health workers (doctors, midwives, and nurses) to the performance of primary health services (outpatient utilization rate, fourth visit of antenatal care, proportion of delivery assisted by health workers, basic immunization coverage) at the district/city level using the output-oriented DEA VRS method. This study used the proportion of health workers per population as an input variable. The ratio of health workers per population is one of the most commonly used calculations in health service planning and assessment, because it allows comparisons between regions and subregions with different population sizes and is easy to calculate, and is a good measure of inequalities between districts (Anand and WHO 2010). The second stage is to determine the effect of environmental/contextual factors on the efficiency of primary health care performance using the Tobit regression analysis method, where the efficiency score is censored at 1 and it has been widely used in efficiency studies (McDonald 2009; Mujasi, Asbu, and Puig-Junoy 2016).
The variables of the first stage of this study were independent variables consisting of input variables in the form of proportion of health human resources at the district/city level and output variables in the form of primary health service coverage at the district/city level, while the dependent variable is the efficiency of primary health services. A strong primary health care system has a major impact on better and more equitable health outcomes (Macinko, Starfield, and Erinsho 2009). Based on the framework initiated by the Primary Health Care Performance Initiative (PHCPI) in 2017, factors used to assess the performance of primary health services are grouped into 5 main parts that are interrelated with each other, namely: system, input, health service, output and outcomes (Bitton et al. 2017). Therefore, in the second stage of the study, the research variables consist of independent variables, namely environmental/contextual factors (type of region, percentage of low socio-economic population and percentage of villages with easy access to healthcare facilities) while the dependent variable is the efficiency of primary health services at the district/city level.

The subject of this study is 504 regencies & cities of 34 provinces in Indonesia, classified into 5 regions for further analysis (Sumatera region, Java-Bali region, Kalimantan region, Sulawesi region and Eastern Indonesia region). This study used secondary data from Susenas 2018, Riskesdas 2018, Podes 2018, PPSDM Database of the Ministry of Health and Main Data from the Ministry of Internal Affairs 2018.

RESULT

**Input and output characteristics of primary health care**

Table 1 presents the input and output statistics. There was wide variation in the level of inputs and outputs by districts. Output variables comprised the percentage of the population covered by key primary care services, with national average rates of 14.2% for outpatient utilisation, 66.7% for pregnancies receiving four antenatal care visits, 64.5% for deliveries assisted by health workers, and 47.4% for receipt of basic immunization. The input variables comprised the proportion of health care workers by district population, with overall average rates of 0.02 doctors per 100 population; 0.20 nurses per 100 population and 0.13 midwives per 100 population.

<table>
<thead>
<tr>
<th>Table 1. Input and Output Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Doctors per 100 population</td>
</tr>
<tr>
<td>Midwives per 100 population</td>
</tr>
<tr>
<td>Nurses per 100 population</td>
</tr>
<tr>
<td>% outpatient utilisation rate</td>
</tr>
<tr>
<td>% ANC K4 coverage</td>
</tr>
<tr>
<td>% Coverage of delivery assisted by health workers</td>
</tr>
<tr>
<td>% Coverage of basic immunization</td>
</tr>
</tbody>
</table>
Technical efficiency

We found wide variation of the efficiency score using the output-oriented DEA VRS model across the 504 districts/cities in Indonesia. In this calculation, the most efficient districts / cities have a score of 1.0, and less efficient districts have a score greater than 1.0. On average over the whole country, the technical efficiency score was 1.29, indicating the potential for primary health care services to improve coverage of PHC services by 29% if existing health care workers were used at the level of the most efficient units. The proportion of districts/cities with the most efficient primary health service performance (ie a DEA score of 1.0) is 22.1% in the Sumatera region, 32.8% in the Java-Bali region, 33.9% in the Kalimantan region, 20.9% in the Sulawesi region and only 8.2% in the East Indonesia region. The following maps (Figure 1) demonstrate the number and distribution of efficient (score of 1) and less efficient (score > 1) districts in the different regions of Indonesia.

![Figure 1 Map of efficiency distribution of primary health services by regions in Indonesia](image)

Table 2. Descriptive Statistics of Regional Primary Health Care Efficiency Score in Indonesia Year 2018 (Districts / cities as the unit of analysis)

<table>
<thead>
<tr>
<th>Region</th>
<th>Observation</th>
<th>Mean</th>
<th>Min</th>
<th>Max</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sumatera</td>
<td>154</td>
<td>1.214</td>
<td>1</td>
<td>2.26</td>
<td>0.258</td>
</tr>
<tr>
<td>Java-Bali</td>
<td>128</td>
<td>1.05</td>
<td>1</td>
<td>1.515</td>
<td>0.079</td>
</tr>
<tr>
<td>Kalimantan</td>
<td>56</td>
<td>1.144</td>
<td>1</td>
<td>1.679</td>
<td>0.195</td>
</tr>
<tr>
<td>Sulawesi</td>
<td>81</td>
<td>1.193</td>
<td>1</td>
<td>2.068</td>
<td>0.228</td>
</tr>
<tr>
<td>Eastern Indonesia</td>
<td>85</td>
<td>1.62</td>
<td>1</td>
<td>9.626</td>
<td>1.082</td>
</tr>
<tr>
<td>Indonesia</td>
<td>504</td>
<td>1.293</td>
<td>1</td>
<td>3.43</td>
<td>0.502</td>
</tr>
</tbody>
</table>

The highest average efficiency score and thus the largest number of districts with large deviations from the most efficient was found in the East Indonesia region with an average score of 1.62, and the least districts with large deviations from the most efficient was found in the Java-Bali region with an average score of 1.05. This reflects that in general, the region with the most efficient primary health care performance is the Java-Bali region, where the potential to improve primary care coverage with the existing workforce is only 5%. On the other hand, the region with the least efficient primary health care performance is the Eastern Indonesia region, which has the potential to improve efficiency in achieving PHC service coverage.
by an average of 62% on average using the available health workers (Table 2).

**Factors determining efficiency**

We categorized region into three groups: city, district with high density of population (more than 96 habitats/km²), otherwise district with low density population (Mulyanto, Kunst, and Kringos 2019). Java-Bali has the most proportion of district with high density of population, while Kalimantan has the most proportion of district with low density of population.

The highest proportion of district with low socio-economic population was in Eastern of Indonesia, and the lowest proportion is in Kalimantan. The highest proportion of village with easy access to health facilities in Java-Bali, and the lowest proportion was in Easter of Indonesia (Table 3).

The results of the Tobit regression show that environmental/contextual variables (type of area, proportion of low socio-economic people, and proportion of villages with easy access to health facilities) in all regions of Indonesia have a significant effect on the technical efficiency of district/city primary health services in Indonesia. However, upon closer examination, it was found that each of these contextual factors had different effects on the technical efficiency of primary health services in each region.

### Table 3. Descriptive Statistics of Contextual Factors

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sumatera</th>
<th>Java-Bali</th>
<th>Kalimantan</th>
<th>Sulawesi</th>
<th>Eastern of Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>n</em></td>
<td>%</td>
<td><em>n</em></td>
<td>%</td>
<td><em>n</em></td>
<td>%</td>
</tr>
<tr>
<td>Type of Region</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>34</td>
<td>22.08</td>
<td>35</td>
<td>27.34</td>
<td>9</td>
</tr>
<tr>
<td>District with high density of population</td>
<td>50</td>
<td>32.47</td>
<td>93</td>
<td>72.66</td>
<td>7</td>
</tr>
<tr>
<td>District with low density of population</td>
<td>70</td>
<td>45.45</td>
<td>0</td>
<td>0</td>
<td>40</td>
</tr>
<tr>
<td>Socio-economic Status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low socio-economic</td>
<td>154</td>
<td>31.28</td>
<td>128</td>
<td>22.24</td>
<td>56</td>
</tr>
<tr>
<td>Access to Health Facilities</td>
<td>154</td>
<td>93.08</td>
<td>128</td>
<td>98.95</td>
<td>56</td>
</tr>
</tbody>
</table>

In general, Table 4 show that in all regions, the performance of primary health services is more efficient in areas with higher proportions of the population with good access to health facilities. In Sumatera, Sulawesi, and Eastern of Indonesia regions, efficiency was significantly higher where the proportion of the poor was less, but no significant association was found in the other regions; while there was no significant difference between city and low density areas in all the regions.

### Table 4. Tobit Regression Result of Sumatera Region Year 2018

<table>
<thead>
<tr>
<th>Variables</th>
<th>Sumatera</th>
<th>Java-Bali</th>
<th>Kalimantan</th>
<th>Sulawesi</th>
<th>Eastern of Indonesia</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>n</em></td>
<td>%</td>
<td><em>n</em></td>
<td>%</td>
<td><em>n</em></td>
<td>%</td>
</tr>
<tr>
<td>City</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
<td>Ref</td>
</tr>
<tr>
<td>District with high density of population</td>
<td>-0.089 (0.063)</td>
<td>-0.050 (0.275)</td>
<td>-0.141 (0.155)</td>
<td>-0.278* (0.107)</td>
<td>-1.334* (0.477)</td>
</tr>
<tr>
<td>District with low density of population</td>
<td>0.048 (0.062)</td>
<td>Empty</td>
<td>0.083 (0.129)</td>
<td>-0.193 (0.118)</td>
<td>-0.649 (0.436)</td>
</tr>
<tr>
<td>Low socio-economic</td>
<td>0.007* (0.002)</td>
<td>0.001 (0.001)</td>
<td>0.002 (0.003)</td>
<td>0.011* (0.003)</td>
<td>0.015* (0.006)</td>
</tr>
<tr>
<td>Easy access to health facilities</td>
<td>-0.009* (0.260)</td>
<td>-0.014* (0.004)</td>
<td>-0.006* (0.002)</td>
<td>0.006 (0.004)</td>
<td>-0.020* (0.007)</td>
</tr>
</tbody>
</table>

### Discussion

**District/City Primary Health Service Efficiency Level in Indonesia**

The result of this analysis demonstrates that there are quite large variations in the efficiency of the performance of primary health services between districts across Indonesia and within regions. These partly reflect the large differences in regional economic development in Indonesia leading to wide variations between districts in terms of living standards, education levels, and physical infrastructure (Kis-Katos and Sjahrr 2017).
These differences are consistent with the results of a study conducted in 2019 which showed that, districts in Java had higher utilization of health services than districts in other areas, and urban areas in Java had higher utilization of primary health services than rural areas. (Mulyanto, Kunst, and Kringos 2019). Another study in the same period stated that the majority of regions with efficient health care systems in Indonesia in 2018 were on the island of Java (Atmanti and Naylah 2019).

Most studies have focused on the distribution of the health workforce and resources as the key factor in the disparities in utilisation of health services, such as the unequal distribution of budget, personnel, and facilities (Hosseinpoor, Bergen, and Floranita 2017). The disparity in the distribution of health workers as reflected in the results of this study is also in line with previous studies which showed that public primary care in Eastern Indonesia experienced more vacancies, especially doctors and midwives, so that the coverage of primary health services that were oriented to promotive and preventive tended to be neglected (Hikmah, Rahman, and Puspitasari 2020).

This study has demonstrated that, even with the existing disparities in the distribution of the health workforce and resources, there are significant differences in the performance of health services, and in the efficiency with which the resources, particularly the workforce are used in achieving service outcomes. It highlights the potential for improvement in health service outcomes with the existing health workforce.

The disparities in efficiency are likely related to issues of the management of the health facilities. In the context of health facilities, most primary health services in the form of puskesmas are owned by the district government. Inadequate management by district health offices following the decentralization of the Indonesian government affected the development of public health facility provision (Maharani, Femina, and Tampubolon 2015). In addition, in terms of health sector development, the mechanisms of accountability of District Governments in meeting national standards for health service delivery to the Ministry of Health and Provincial Governments, have not been fully effective (Heywood and Choi 2010; Kemenkes 2019). The various decentralization measures of the Indonesian government, such as essential health services at the district level since 2001 may have contributed to this situation (Kemenkes 2019). Previous studies have discussed that government decentralization is often the cause of geographical disparities in health services in both middle and high income countries (Abimbola, Baatiema, and Bigdeli 2019).

Although the existence of a health care facility infrastructure is a basic requirement to provide primary health care to the community, there are other factors that influence whether the services provided are in accordance with the needs of the population. These factors include the number and level of qualifications of health workers and the availability of supporting equipment. The number of health workers with specific qualifications, such as doctors, nurses, and midwives, varies greatly between districts in Indonesia, and this is likely to affect the type, volume and quality of services provided to the community (Heywood and Harahap 2009). The availability of necessary medical devices and essential medicines is also uneven among public health facilities due to differences in local government investment and procurement procedures (Heywood and Choi 2010).

Studies in low-middle income countries and developed countries show that disparities in health care resources among local governments are likely to affect their ability to provide responsive health care to local communities which can lead to inequalities in primary health care performance in different regions (Chaix-Couturier et al. 2000; Eboreime, Abimbola, and Bozzani 2015; Kuhn et al. 2017).

Variations in the efficiency of primary health care performance between districts/cities can also be driven by variations in the financial incentive system for health workers working in district/city-owned health facilities (Bernal and Martinez 2020; Akpan 2021). The district government has full authority to manage the institution’s financial system, including the financial incentive system for employees such as general practitioners and specialists. A systematic review study in lower-middle-income and
high-income countries has documented that financial incentives are a major determinant of the behavior and performance of health workers (Chaix-Couturier et al. 2000).

The Influence of Contextual Factors on the Efficiency of District/City Primary Health Services in Indonesia

Contextual factors that influence the efficiency of health service delivery found in this study include the extent of rurality, and the socio-economic conditions of the population served. People in rural areas tend to have lower awareness of the importance of health care efforts than people in urban areas (Anhar, Imran, and Ismail 2016). In Indonesia, as elsewhere, cities are characterized by more advanced health infrastructure (Mahendradhata et al. 2017), providing residents with easier physical access, and hence the advantages of shorter travel times, lower travel costs, and shorter waiting times (Utomo, Sucahiya, and Utami 2011). Urban areas also offer greater volume and higher quality of primary health care than rural areas (Barber, Gertler, and Harimurti 2007).

Socio-economic disparities along with supporting factors such as income levels and employment status of the head of the family have been found to be a significant influence on the utilization of primary health services. For health human resources, areas with higher socio-economic conditions of society are considered more profitable for health workers with the opportunity to practice in private health facilities, such as private practices and private hospitals, outside of primary health care duties (Mulyanto, Kringos, and Kunst 2019; Rabbaniyah and Nadjib 2019). Various studies also show that the level of well-being is closely related to the individual’s ability to pay for health services, and this ability is closely related to the cost of health care. This is because people with higher levels of welfare can better cope with health-related opportunity costs through their financial resources (Ensor and Cooper 2004; O’Donnell 2007; Peters et al. 2008; B. Jacobs et al. 2012; Levesque, Harris, and Russell 2013).

In terms of access to health facilities, the findings in this study are in line with previous studies which stated that the average travel time and cost to the nearest primary health care facility were very long and high in most districts in Sumatra, Kalimantan, and Papua, as well as in other districts, remote districts, such as in Maluku and Nusa Tenggara. Higher travel costs in areas where access to health facilities is more difficult is also associated with lower outpatient utilisation (Mulyanto, Kringos, and Kunst 2019). This is certainly not attractive for health workers who will serve in these areas.

CONCLUSION

This study has demonstrated a wide variation in the level of efficiency of primary health services in using their health workforce to achieve coverage of key primary care services. The proportion of districts/cities with the most efficient primary health service performance varies among regions from 22.1% in the Sumatra region, 32.8% in the Java-Bali region, 33.9% in the Kalimantan region, 20.9% in the Sulawesi region to 8.2% in the East Indonesia region.

The highest deviation from the most efficient use of the workforce is found in the East Indonesia region while the lowest deviation is found in the Java-Bali region. This reflects that in general the region with the most efficient primary health care performance is the Java-Bali region, while the region with the least efficient primary health care performance is the Eastern Indonesia region.

The results of the Tobit regression show that together environmental/contextual variables (type of area, proportion of low socio-economic people, and proportion of villages with easy access to health facilities) in all regions of Indonesia have a significant effect on the technical efficiency of district/city primary health services in Indonesia. However, upon closer examination, it was found that each of these contextual factors had different effects on the technical efficiency of primary health services in each region.

In general, the results show that the influence of contextual factors in various regions is in line with the initial assumption of the study, that: the performance of primary health services is more efficient in urban areas than in rural areas, which have a high socio-economic level of society and have easy access to health services. Among the three contextual factors tested, it was found that the easy access to health care facilities had a
significant significance on the efficiency of primary health care in almost all regions.

RECOMMENDATIONS

The results of this study demonstrate the potential benefits in terms of improved coverage of key primary health care services that could be achieved by improvements in efficiency, rather than just focusing on increasing the number of the health workforce. By knowing the efficiency scores of primary health services for each region and identifying which regions have more efficient primary health service performance, for local governments can conduct benchmarking/comparative studies at the regional level to identify more targeted performance improvement measures.

The identification of specific contextual factors that have a significant influence in each region can be used as a reference for both local and central governments in determining the appropriate performance improvement strategy for each region in accordance with their environmental background.

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