

DOES THE NUMBER OF HUMAN RESOURCE IMPACT EFFICIENCY OF PUBLIC HEALTH ORGANIZATION IN SLEMAN REGENCY?

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Abstract. Public health organization is a kind of health services for both an individual and public which focused on promotive and preventive effort to reach a maximum degree of healthy in a certain area. There are minimum requirements of public health organizations are allow to operate. One of requirements is how many human resource needed to work inside either health or non health personnel. The number of human resource in every public health organization as input are compared by the outputs such as the number of patient visits, diarrhea cases and dengue fever cases handled by the public health organization. The comparison between input and output is called efficiency. In 2018, Sleman, known as one regency of Yogyakarta Province, has 25 public health organizations which is held hospitalization and unheld hospitalization service. There are 15 public health organization doesn't held hospitalization and the rest are held hospitalization services. This research is focused in only public health services that doesn't held hospitalization service. The aim of this research is to find efficiency score in every public health services. To find this score, this research used Data Envelopment Analysis (DEA) and every public health organizations are involved as Decision Making Unit (DMU). After processed using DEA, a score will be generated. The score is divided into two parts, one and below one, which shows the efficiency of every public health organization. The public health organization which has score one, means efficient, while the public health organization which has score below one, means inefficient. Every public health organization that has inefficient score always has their own benchmarks. The benchmarks are choosen from the public health services which is efficient. Due to the result, there are only 6 public health organizations (40%) states efficient such as Depok II, Depok III, Gamping I, Gamping II, Mlati I, and Moyudan while the rest of 9 public health organizations (60%) states inefficient such as Cangkringan, Depok I, Godean II, Ngaglik I, Ngaglik II, Ngemplak II, Pakem, Prambanan and Tempel II.

Keywords: Data envelopment analysis, decision making unit, efficiency, human resource.

1. INTRODUCTION

The Puskesmas has proven to be the vanguard of public health services that are able to reach the grassroots ^[1]. Because its function is capable of reaching grassroots, puskesmas are the most popular facilities for the community followed by other services such as polyclinics and hospitals^[2]. According to Minister of Health's regulation number 47 section 1 2018, when compared to polyclinics that provide basic or specialist medical services and hospitals that are able to provide plenary services, puskesmas are not as superior as them because puskesmas prioritize promotive and preventive services, but actually both functions are most touching community^[3]. One of the main elements that plays a role in carrying out promotive and preventive services is the human resources. According to the Regulation of the Minister of Health of the Republic of Indonesia Number 75 section 16 2014 concerning Public Health Centers, human resources are located in health centers includes health and non-health workers^[4]. The number and type of health or non-health workers placed in each puskesmas are determined based on the criteria set out by the Regulation of the Minister of Health.

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Sleman Regency which is one of the regions of the Special Region of Yogyakarta is located at an altitude of 100-2500 meters above sea level with an area of 57,482,000 Ha. The following is the Sleman Regency statistical data as shown in table 1 below

Table 1. Statistic of Sleman

Indicator	Total
Sub-district	17
Village	86
Hamlet	1.212
Resident	1.062.861
Puskesmas	25
Hospitalization	10
Unhospitalization	15
Health personnel	362
Non health personnel	174
DBD Case	153
Diarhea case	6.684
Number of patient visits	761.842

Source : Health Profile of Sleman, 2018

Based on the table above, Sleman Regency has 536 human resources in 25 public health centers. The ratio of health personnels or non-health personnels will affect the performance of the health center^[5]. Even though the performance of puskesmas is measured by the amount of efficiency^[6]. Efficiency is related to the relationship between the output of health services and the resources used. The implication of efficiency measurement is to obtain information: first, the output produced from an efficient puskesmas is greater than an inefficient puskesmas^[7]; secondly, the output from inefficient health centers is usually not optimal because there are unnecessary uses of resources^[8]; and third, efficiency will be achieved by maximizing output^[9].

The aim of this research has not been to the quality of human resources to produce optimal health center performance^[10]. The emphasis of this research is only on the quantity of human resources in each puskesmas to see how efficient a puskesmas is with the availability of existing human resource ^{[1] [11] [12]}. Similar research uses human resource as an input variable ever^{[1] [2] [11] [12]} but because the puskesmas is a multi-output unit, this research uses output that is different from previous research, namely using the output number patient visits, number of cases of diarrhea and the number of cases of Dengue Hemorrhagic Fever (DHF). The amount of human resources placed in each puskesmas will affect the number of patient visits because a lot of lack of human resources will affect the performance of a puskesmas. Society will tend to visit optimal health centers for patients^[1]. The number of cases of diarrhea and DHF is important to study because they are a priority target of prevention and eradication of infectious diseases and annual outbreaks of Extraordinary Events (KLB) in several regions in Indonesia which are contained in the national long-term development year 2005 - 2025^[13]. The outbreak prevention policy can be overcome by adding human resources, especially health workers^[14].

Based on the explanation above, this research is interesting to study by using the number of human resources as input as well as the number of patient visits, the number of diarrhea cases and the number of dengue cases as output.

2. LITERATURE REVIEW

2.1. Human Resource Regulation

A puskesmas has a minimum standard of the number of human resources that must be fulfilled^[15]. For health workers, the minimum standard is shown in table 2 below

Table 2. Minimum Health Center Standards for Puskesmas

Kind of Personnel	Non hospitality	Hospitality	DTPK
General doctor	1	2	2
Dentist	1	1	1
Pharmacist	-	1	-
Kesmas (S1)	1	1	1
Nurse (S1)	-	1	1
Promkes (D4)	1	1	1
Epidemiologist (D4)	1	1	1
Midwife (D3)	4	6	4
Nurse (D3)	6	10	8
Sanitarian (D3)	1	1	1
Nutricionist (D3)	1	1	1
Dentist Assistant	1	1	1
Pharmacist Assistant	1	1	1
Analyst (D3)	1	1	1
Support staff	1	1	1
Total	21	30	25

Source: Regulation of Minister of Health no 81, 2004

While the minimum standards for non-health workers are shown in table 3 below

Table 3. Minimum Standards for Non-Health Workers of the Puskesmas

Kind of personnel	Total
Head of administration subdivision (D3 Kes)	1
Accounting staff	1
Administration staff (SMA/SMK)	2
Driver	1
Security	1
Total	6

Source: Regulation of Minister of Health no 81, 2004

Minimum standards for the number of health and non-health personnels are needed to maintain the quality of health center services. To determine the type, amount and qualification, it is adjusted to the health planning needs in each region by considering the willingness and ability of human resources.

2.2. Efficiencies and Data Envelopment Analysis (DEA)

Efficiency is the optimal comparison between output and input. Specifically, the efficiency of the puskesmas measures the comparison between the output of health services and source inputs power. Output is interpreted as the result of health center health services while inputs are interpreted as physical inputs[16].

Data Envelopment Analysis (DEA) is a common method of measuring efficiency because it is relevant to measuring the level of relative efficiency of decision-making units (DMU) by comparing the combination of outputs and inputs from the best health facilities[17] and increasing savings in source inputs certain power[18]. There are two factors that influence the selection of DMU, namely, first, the DMU must be a homogeneous unit, namely the unit that performs the same tasks and objectives. Second, the input and output characteristics of the DMU must be identical, may differ in intensity and size/magnitude[19].

DEA has 4 commonly used models, namely:

- a. CRS Input
- b. CRS Output
- c. VRS Input
- d. VRS Output

CRS is a DEA model that uses the Constant Return to Scale assumption, while VRS uses the Variable Return to Scale assumption. CRS is a DEA model introduced by Charnes, Cooper and Rhodes (CCR) in 1978. The CRS assumption allows DMUs to add or reduce their input /output linearly without experiencing changes in the value of efficiency. VRS is the DEA model introduced

by Banker, Charnes and Cooper (BCC) in 1984. The VRS assumption does not require linear input / output changes so that the efficiency value can change. The orientation of the DEA is divided into two, namely input orientation and output orientation. Input orientation indicates that managers of a DMU can only control inputs, while output orientation indicates that managers of a DMU can only control output.

3. RESEARCH METHODS

This study uses secondary data obtained from reliable main sources such as Sleman District Health Office, DIY Provincial Health Office, Sleman Regency Central Bureau of Statistics and Sleman Regency Health Profile 2018. The Puskesmas that is used as the object of research is a Puskesmas that does not carry out hospitalization.

The DEA model used is the DEA BCC model assuming input-based Variable Return to Scale. That is, researchers can only control inputs and cannot control output so that the efficiency value changes. The researcher could not control the amount of patients visiting the health center, the number of dengue cases and the number of cases of diarrhea. Researchers can only control the amount of health and non-health workers to be able to change the value of efficiency.

Efficiency value is obtained after processing input and output data using DEA software. If the result shows number 1 then the Puskesmas is said to be efficient, if the result is less than 1 then the Puskesmas is said to be inefficient.

4. RESULT AND DISCUSSION

After processing using DEA, the efficiency values of each Puskesmas in Sleman Regency are reflected in the following table 4

Table 4. Efficiency Value of Puskesmas in Sleman

No	Puskesmas	Efisiensi	Benchmark
1.	Cangkringan	0,57	Depok III, Gamping II, Moyudan
2.	Depok I	0,636	Depok III, Gamping I, Gamping II
3.	Depok II	1	-
4.	Depok III	1	-
5.	Gamping I	1	-
6.	Gamping II	1	-
7.	Godean II	0,97	Depok III, Gamping II, Moyudan
8.	Mlati I	1	-

9.	Moyudan	1	-
10.	Ngaglik I	0,93	Gamping I, Gamping II
11.	Ngaglik II	0,88	Depok III
12.	Ngemplak II	0,86	Depok III, Gamping I, Gamping II
13.	Pakem	0,91	Gamping II, Moyudan
14.	Prambanan	0,48	Depok III, Gamping I
15.	Tempel II	0,87	Gamping II, Moyudan

Source : Result of DEA, 2019

Based on table 4 above, it can be seen that there are 6 puskesmas stated effiecient and 9 other are inefficient.

4.1. Efficient

Based on table 4, it can be seen that Puskesmas Depok II, Depok III, Gamping I, Gamping II, Mlati I and Moyudan are 100% efficient. This means that the amount of human resources available at these health centers has been efficient to handle the number of patients visiting, dengue cases and diarrhea cases. The Puskesmas does not need to increase or decrease the number of HR because the amount currently available has offset the output used. The following is a comparison of the number of inputs and outputs in each efficient health center

Table 5. Comparison of inputs and outputs

No	Puskesmas	Personnel*	Visiting Number	DBD Cases	Diarrhea Cases
1.	Depok II	18 & 9	39.308	22	349
2.	Depok III	26 & 12	99.453	9	414
3.	Gamping I	24 & 15	54.159	29	693
4.	Gamping II	25 & 12	59.410	23	625
5.	Mlati I	25 & 8	67.077	8	344
6.	Moyudan	24 & 8	43.102	14	485

Source : Result of DEA, 2019

*Personnel : (health staff & non health staff)

4.2. Inefficient

Based on table 4 above, it can be seen that the Cangkringan Health Center, Depok I, Godean II, Ngaglik I, Ngaglik II, Ngemplak II, Pakem, Prambanan and Tempel are inefficient. Inefficient due to comparison of input numbers with less than one output. For more details, the following is the presentation of inefficient health centers.

4.2.1. Cangkringan

The DEA result show as follow

Table 6. Analysis Result

Input	Puskesmas Cangkringan	
	Projected to be efficient (staff)	Actual (staff)
	Score 57%	
Health staff	13	23
Non health staff	5	9

Source: DEA result, 2019

Based on table 6 above, using the actual conditions will make the Puskesmas Cangkringan at the current efficiency value of 57%. If they wants to reach an efficient number, then the condition should be adhered. Cangkringan must reduce its health staff by 10 people, and reduce the number of non-health staff by 5 people.

4.2.2. Depok I

The DEA result shows as follow

Table 7. Analysis Result

Input	Puskesmas Depok I	
	Projected to be efficient (staff)	Actual (staff)
	Score 64%	
Health staff	15	23
Non health staff	8	13

Source: DEA result, 2019

Based on table 7 above, using the actual conditions will make the Puskesmas Depok I at the current efficiency value of 64%. If they wants to reach an efficient number, then the condition should be adhered. Depok I must reduce its health staff by 8 people, and reduce the number of non-health staff by 5 people.

4.2.3. *Godean II*

The DEA result shows as follow

Table 8. Analysis Result

Input	Puskesmas Godean II	
	Projected to be efficient (staff)	Actual (staff)
Health staff	25	26
Non health staff	11	11

Source: DEA result, 2019

Based on table 8 above, using the actual conditions will make the Puskesmas Godean II at the current efficiency value of 97%. If they wants to reach an efficient number, then the condition should be adhered. Godean II must reduce its health staff by 1people, and still maintaining 11 people of non health staff.

4.2.4. *Ngaglik I*

The DEA result shows as follow

Table 9. Analysis Result

Input	Puskesmas Ngaglik I	
	Projected to be efficient (staff)	Actual (staff)
Health staff	19	21
Non health staff	11	12

Source: DEA result, 2019

Based on table 9 above, using the actual conditions will make the Puskesmas Ngaglik I at the current efficiency value of 94%. If they wants to reach an efficient number, then the condition should be adhered. Ngaglik I must reduce its health staff by 3 people, and reduce the number of non-health staff by 1 people.

4.2.5. *Ngaglik II*

The DEA result show as follow

Table 10. Analysis Result

Input	Puskesmas Ngaglik II	
	Projected to be efficient (staff)	Actual (staff)
	Score 88%	
Health staff	19	22
Non health staff	9	12

Source: DEA result, 2019

Based on table 10 above, using the actual conditions will make the Puskesmas Ngaglik II at the current efficiency value of 88%. If they wants to reach an efficient number, then the condition should be adhered. Ngaglik II must reduce its health staff by 3 people, and reduce the number of non-health staff by 3 people.

4.2.6. *Ngemplak II*

The DEA result show as follow

Table 11. Analysis Result

Input	Puskesmas Ngemplak II	
	Projected to be efficient (staff)	Actual (staff)
	Score 86%	
Health staff	20	23
Non health staff	9	11

Source: DEA result, 2019

Based on table 11 above, using the actual conditions will make the Puskesmas Ngemplak II at the current efficiency value of 86%. If they wants to reach an efficient number, then the condition should be adhered. Ngemplak II must reduce its health staff by 3 people, and reduce the number of non-health staff by 2 people.

4.2.7. *Pakem*

The DEA result show as follow

Table 12. Analysis Result

Input	Puskesmas Pakem
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	Score 91%	
	Projected efficient (staff)	to be Actual (staff)
Health staff	25	27
Non health staff	9	10

Source: DEA result, 2019

Based on table 12 above, using the actual conditions will make the Puskesmas Pakem at the current efficiency value of 91%. If they wants to reach an efficient number, then the condition should be adhered. Pakem must reduce its health staff by 2 people, and reduce the number of non-health staff by 1 people.

4.2.8. Prambanan

The DEA result show as follow

Table 13. Analysis Result

Input	Puskesmas Prambanan	
	Projected efficient (staff)	to be Actual (staff)
Health staff	15	31
Non health staff	8	23

Source: DEA result, 2019

Based on table 13 above, using the actual conditions will make the Puskesmas Prambanan at the current efficiency value of 48%. If they wants to reach an efficient number, then the condition should be adhered. Prambanan must reduce its health staff by 16 people, and reduce the number of non-health staff by 15 people

4.2.9. Tempel II

The DEA result show as follow

Table 14. Analysis Result

Input	Puskesmas Tempel II
	Score 87%

	Projected to be efficient (staff)	Actual (staff)
Health staff	21	24
Non health staff	8	9

Source: DEA result, 2019

Based on table 14 above, using the actual conditions will make the Puskesmas Tempel II at the current efficiency value of 87%. If they wants to reach an efficient number, then the condition should be adhered. Tempel II must reduce its health staff by 3 people, and reduce the number of non-health staff by 1 people.

4.3. Discussion

To overcome the inefficiency of puskesmas non-hospitalization, there are three strategies that can be applied by policy makers, namely: a) increasing the coverage of health service output, b) reducing resource inputs, and c) changing processes / organizations[20]. Since this research uses the input-based DEA BCC model, VRS assumptions, strategies point a and point c are outside the scope of the discussion. Treatment that is imposed on non-hospitalization health centers that is inefficient to get efficient is by reducing the number of health and non-health staff which are inputs according to a certain dose.

5. CONCLUSION

Based on the results of the DEA analysis, it can be concluded that the non-hospitalization puskesmas in Sleman Regency are not yet 100% efficient. There are 9 out of 15 non-hospitalization puskesmas that have not been efficient.

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