

# Efficiency Analysis of Local Government Health Service in West Sumatra Province Using Data Envelopment Analysis (DEA)

Gesit Thabrani, Muhammad Irfan, Hendri Andi Mesta

Faculty of Economics  
Universitas Negeri Padang  
Padang, Indonesia  
gesitthabrani@gmail.com

Lidyana Arifah

Nurul Fikri  
Jakarta, Indonesia

**Abstract**—Health services in Indonesia are still constrained by the low performance seen in the HDI rating of 121 out of 186 countries. Based on HDI, West Sumatra is ranked 9th at the national level, but there are still considerable differences between regions. Since decentralization of health has been introduced, disparities among regions have been sharpened due to the different health resources of each region. This study aims to analyze the efficiency of health services of all district / city governments in West Sumatra. Data analysis using Data Envelopment Analysis (DEA). The results showed that the level of efficiency of inter-regional health services in West Sumatra province is classified as 60%.

**Keywords**—benchmark; health decentralization; efficiency; health resources

## I. INTRODUCTION

Indonesia's health development is still encounter challenges in the form of relatively low health service system performance. Based on the 2013 Human Development Index, Indonesia ranked 121 out of 186 countries. Other health indicators are reflected in the life expectancy of the Indonesian population at 69.8 years. This figure is lower compared to several neighboring countries in Southeast Asia, such as Vietnam (75.4 years), Malaysia (74.5 years), Thailand (74.3 years), and the Philippines (69 years) and to the average East Asia and Pacific countries (72.7 years) [1]. In addition, the performance of health services is also shown by the infant mortality rate in Indonesia. UNICEF 2012 Annual Report (2013) added that 1 in 23 Indonesian children died before the age of 5.

West Sumatra is one of the provinces in Indonesia which has a human development index in 2013 with a number of 75.01 and ranked ninth. But in this province, there are sharp variations between regions, from the lowest in the Mentawai archipelago with 69.72 to the highest in Bukittinggi City with 79.29. Life expectancy of West Sumatra as a reflection of health service performance reaches 70.09 years. This figure at the regional level has a range from 64.94 in South Solok to 72.11 years in Sawahlunto [2].

The implementation of decentralization or regional autonomy has fundamentally changed the health care system in Indonesia. Decentralization surrounding the health sector provides significant changes in the roles and responsibilities of various levels of government. Responsibility for the implementation of health services has been transferred to the local government at the district / city level along with health workers, policy making and budgeting. Health decentralization is expected to develop local initiatives in the development of health in the region, provide space for policy makers to respond to challenges, bring services closer, take advantage of opportunities and optimize local resources for regional health development. In addition, the problem of health service disparity and the sharp performance of health system services between regions are expected to be overcome.

The variety of achievements in the output of local government health services is related to the allocation and availability of various health inputs such as the ratio of the number of health centers, the ratio of general practitioners and the ratio of the number of nurses. Adisasmito revealed that health management since regional autonomy has not provided an encouraging picture of conditions [3]. Therefore, every health policy maker in the region needs to pay attention to elements of planning, administration, regulation and legislation. These elements make up local health management in supporting production resources, providing health services, organizing health services, in addition to funding sources. Health management also requires the fulfillment of good governance by fulfilling the principles of transparency, accountability and public accessibility to health service institutions.

Efficiency analysis is one of the parameters used to measure the performance of an organization. One of the approaches for calculating efficiency is Data Envelopment Analysis (DEA). This method has become the dominant approach to measure the efficiency of health services and in various other economic sectors [4,5].

A number of health service efficiency studies make the performance of health services by a country or region as an output. Afonso, Schuknecht and Tanzi examined the efficiency

of government spending on health outcomes in OECD countries [6]. Afonso and Aubyn examined the efficiency of health and education service provision in OECD countries using physically measured inputs [7]. Mirmirani et al. examined the efficiency of health services in transition countries [8]. At the regional government level Loikkanen and Susiluoto use DEA in assessing cost efficiency in general, including health in local governments in Finland [9]. Afonso and Fernandes assessed the relative efficiency of local government in Portugal [10].

The lack of research on the efficiency of local government health services led to this research being quite important. The relative breadth of the use of DEA for efficiency studies includes regional health services because it provides benefits to decision-making units in this case regional health service policy makers.

The Inter-University Center for Economic Studies, Gadjah Mada University and Makmun describe a number of managerial values of DEA. First, DEA generates efficiency for each economic decision unit (UKE) in this case the regional health service policy determinant, relative to other UKE in the sample. This efficiency figure allows an analyst to recognize the UKE that needs the most attention and plan corrective actions for UKE that are not / less efficient [11,12].

II. METHOD

The focus of health service efficiency analysis is the organization's production of health services which is often called the Economic Activity Unit (UKE) or Decision-Making Units (DMU) in the form of a regional government health service system. The Economic Activity Unit consumes various regional government health budgets such as number of doctors, number of nurses, and number of inpatient beds. The output of health services used is life expectancy and the percentage of people who experience health complaints. The conceptual framework used in this study adopted a health service efficiency analysis model as stated by Jacobs et. al [5] as presented in figure 1:

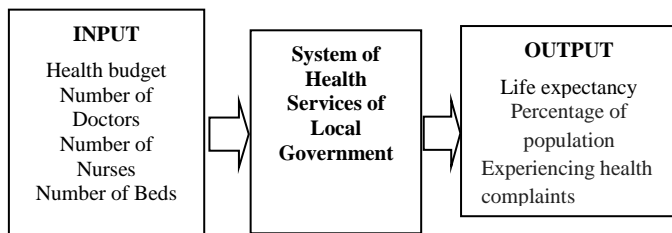


Fig. 1. Conceptual framework research.

The input and output variables used are adopting Afonso and Aubyn [7], some of which are also used by Mirmirani [8]. The difference in this study is the output in the form of under-five mortality, while Afonso and Aubyn use the level of infant resilience and Mirmirani uses infant mortality. The unit of analysis used in this research is 19 regions in West Sumatra Province. The calculation of efficiency scores was carried out for five years, from 2009 to 2013. Data analysis techniques in this study use the DEA approach and compare the 2 models to

calculate the calculation of the efficiency score of each region assuming the variable return to scale (VRS).

TABLE I. VARIABLES AND MODELS USED IN EFFICIENCY MEASUREMENT LOCAL GOVERNMENT HEALTH SERVICES

Variable	Model 1	Model 2
<i>Input</i>		
1. Per capita Health Expenditure	x	x
2. The Ratio of doctors per 100.000 population	x	x
3. The Ratio of nurses per 100.000 population	x	x
4. Number of beds per 100.000 population		x
<i>Output</i>		
1. Life Expectancy	x	
2. Percentage of population experiencing health complaints		x

The efficiency of health services for each local government will be estimated by the DEA formulation with VRS assumptions, namely:

Maximize:

$$Z_k = \sum_{r=1}^s u_{rk} y_{rk} + u_0$$

Subject to :

$$\sum_{r=1}^s u_{rk} y_{rj} - \sum_{i=1}^m v_{ik} x_{ik} \leq 0 \quad ; j = 1, \dots, n.$$

$$\sum_{i=1}^m v_{ik} x_{ik} = 1$$

$$u_{rk}, v_{ik} \geq 0 \quad r = 1, \dots, s; i = 1, \dots, m.$$

where:

$y_{rk}$  = output  $r$  produced by local government  $k$ .  
In model 1 and 2,  $r$  is life expectancy rate and the percentage of population experiencing health complaints

$x_{ij}$  = input  $i$  used by by local government  $j$  which are health budgets, doctors, nurses number of beds.

$y_{rj}$  = output  $r$  produced by local government  $j$ .

$x_{ik}$  = input  $i$  used by local government  $k$ .

$S$  = Number of local government which has been analyse is 19 regions

$M$  = Number of inputs has been used

$u_{rk}$  = Weighted of output  $r$  produced by every local government  $k$

$v_{ik}$  = Weighted of input  $i$  used by by local government  $k$

$Z_k$  = Optimize value as efficiency indicator relative from the local government  $k$

Efficiency scores range from 0 to 1 or 0 to 100 percent. An efficient local government has an efficiency score of 1 or 100 percent. Conversely, inefficient regional governments have a value of less than 1. To achieve the second goal of this study, the magnitude of the potential improvement of health services for local governments is inefficient against the benchmark areas. Based on Banxia Holding Limited, efficiency studies not only provide efficiency scores for each unit but also show the

magnitude and variables for inefficient units that require improvement to be efficient. This information provides targets that must be achieved that can help provide direction for units that are not efficient in improving their performance.

### III. RESULTS

The efficiency score from model 1 could be seen in table 2:

TABLE II. EFFICIENCY LEVEL OF HEALTH SERVICES OF LOCAL GOVERNMENT IN WEST SUMATRA PROVINCE BY MODEL 1

Unit	2010	2011	2012	2013	2014	Mean	Std. Deviation
Kepulauan Mentawai	44,38	65,41	64,24	93,96	38,58	61,31	21,76
Pesisir Selatan	100	100	99,35	96,76	91,27	97,48	3,72
Solok	82,49	81,49	70,75	72,54	100	81,45	11,61
Sijunjung	49,06	57,30	53,80	51,72	67,06	55,79	6,98
Tanah Datar	71,77	59,15	50,25	58,06	85,15	64,88	13,71
Padang Pariaman	71,05	74,29	100	67,86	90,09	80,66	13,78
Agam	90,63	71,63	65,90	72,35	96,09	79,32	13,20
Limapuluh Kota	87,67	76,58	85,99	89,95	88,86	85,81	5,36
Pasaman	69,85	62,75	62,34	69,93	60,06	64,99	4,59
Solok Selatan	66,56	66,79	60,15	66,03	70,04	65,91	3,59
Dharmasraya	36,56	41,53	40,68	44,03	62,98	45,16	10,32
Pasaman Barat	81,65	90,19	70,32	100	100	88,43	12,70
Padang	100	100	100	100	100	100,00	0,00
Kota Solok	40,72	35,29	38,91	39,40	42,47	39,36	2,66
Sawahlunto	30,50	33,31	23,53	30,39	37,16	30,98	4,99
Padang Panjang	44,86	28,24	30,71	38,00	42,84	36,93	7,30
Bukit Tinggi	53,45	79,96	48,26	54,72	80,75	63,43	15,64
Payakumbuh	53,66	42,56	38,21	41,89	48,42	44,95	6,09
Pariaman	40,77	29,96	28,23	33,1	41,93	34,80	6,24
<b>Mean</b>	<b>63,98</b>	<b>62,97</b>	<b>59,56</b>	<b>64,25</b>	<b>70,72</b>	<b>64,30</b>	<b>8,65</b>
<b>Minimum</b>	<b>30,5</b>	<b>28,24</b>	<b>23,53</b>	<b>30,39</b>	<b>37,16</b>	<b>30,978</b>	<b>0</b>
<b>Standard Deviation</b>	<b>22,13</b>	<b>22,84</b>	<b>24,11</b>	<b>23,52</b>	<b>23,45</b>	<b>21,58</b>	<b>5,48</b>

<sup>a</sup> Where: Input consists of per capita health budgets, ratio of puskesmas per 100.000 population and ratio of doctors per 100.000 population. Output is life expectancy. Assuming Constant Return to Scale to maximize output.

In general, Padang City is an area that is consistently an efficient area for all years of analysis. In addition, the South Coast in 2010 and 2011 then Pariaman in 2012. Subsequently replaced by West Pasaman in 2013 and 2014. The lowest efficiency level for five years was dominated by the City of Sawahlunto with scores below 40 percent, except in 2011 which were listed by Padang Panjang City.

The range value that shows a sharp difference in the level of efficiency of local government services is strengthened by the average value and standard deviation. The average score of efficiency score in 2010 is 63.98 percent. In 2011 a number of measures of spread showed a decrease in the level of efficiency and an increase in the inequality of health service performance. The general decline in the efficiency level is indicated by the average value which decreased to 59.56 percent. Service inequality is shown by the range which increased to 71.76, from the lowest of 28.24 percent in Padang City, up to 100 or efficient in Padang City and South Coastal District. Strengthened by an increase in standard deviation of 22.84.

The average increase in efficiency occurred in 2012 and 2013. However, it was marked by an increase in inequality in service efficiency which was marked by a standard deviation that rose sharply in 2012 amounting to 24.11. Increased efficiency of regional health services increased in 2014 with an average value of 70.72. The decrease in performance inequality decreased even though it was relatively insignificant, namely the increase in the minimum value to 30.39 and the decrease in the standard deviation to 23.52.

A different general pattern occurred again in 2014, service performance has decreased but the distribution of health service performance has improved. The average value dropped sharply to 62.97. The minimum value increased significantly to 37.16 so that it played a role in reducing the standard deviation even though it was thin to 23.45.

TABLE III. LEVEL OF EFFICIENCY OF LOCAL GOVERNMENT HEALTH SERVICES IN THE PROVINCE OF WEST SUMATRA WITH MODEL 2

Unit	2010	2011	2012	2013	2014	Mean	Std. Deviation
Kep. Mentawai	48,31	68,5	75,53	89,47	36,79	63,72	21,14
Pesisir Selatan	100	100	100	87,42	81,77	93,84	8,67
Solok	80,9	79,47	69,97	79,05	100	81,88	11,01
Sijunjung	53,1	60,68	56,4	59,51	63,82	58,70	4,11
Tanah Datar	54,62	44,64	39,49	48,85	60	49,52	8,07
Padang Pariaman	53,38	55,35	70,54	50,8	61,34	58,28	7,88
Agam	84,08	67,7	68,9	76,05	72,9	73,93	6,57
Limapuluh Kota	73,9	71,04	70,34	66,99	64,49	69,35	3,66
Pasaman	74,22	67,24	68,41	69,23	62,79	68,38	4,10
Solok Selatan	53,35	50,55	55,7	52,87	61,51	54,80	4,18
Dharmasraya	33,62	39,86	36,34	47,24	58,52	43,12	10,01
Pasaman Barat	75,69	94,46	80,69	100	100	90,17	11,30
Padang	100	100	100	100	100	100,00	0,00
Solok	41,22	29,93	35,31	44,65	41,71	38,56	5,90
Sawahlunto	26,4	27,62	18,57	25,54	28,64	25,35	3,97
Padang Panjang	37,58	25,13	32,89	41,81	35,97	34,68	6,23
Bukit Tinggi	47,77	66,29	40,1	51,51	63,88	53,91	11,03
Payakumbuh	46,73	36,07	38,25	40,69	42,11	40,77	4,05
Pariaman	30,37	23,23	27,26	34,47	35,55	30,18	5,10
<b>Mean</b>	<b>58,70</b>	<b>58,30</b>	<b>57,09</b>	<b>61,38</b>	<b>61,67</b>		
<b>Minimum</b>	<b>26,40</b>	<b>23,23</b>	<b>18,57</b>	<b>25,54</b>	<b>28,64</b>		
<b>Standard Deviation</b>	<b>22,37</b>	<b>24,61</b>	<b>23,79</b>	<b>22,13</b>	<b>22,11</b>		

<sup>b</sup> Where: Input consists of per capita health budgets, ratio of puskesmas per 100.000 population and ratio of doctors per 100.000 population. Output is Percentage of population experiencing health complaints. Assuming Constant Return to Scale to maximize output.

The average efficiency level is in line with the decrease in the minimum value of the efficiency score. The lowest efficiency score in 2010 was 26.40 recorded by the City of Sawahlunto. Declining the lowest efficiency score in 2011 to 23.23 which changed its lowest position by Kota Pariaman. In 2013 it dropped sharply to 18.57 which was again recorded by the City of Sawahlunto. The lowest efficiency score in 2013 and 2014 is still held by Kota Sawahlunto, but with a score that increased to 25.54 and 28.64.

The comparison of the spread size between model 2 compared to model 1 shows that the average value in model 2 is lower but the standard deviation is higher than model 1. These findings indicate greater inequality in health services in maximizing short-term output in the form of health figures compared to long-term output in the form of life expectancy.

Areas that achieved efficiency with a score of 100 in model 2 were relatively the same as model 1. The cities of Padang and Pesisir Selatan became two areas that were efficient for three consecutive years namely 2010, 2011 and 2012. In 2013 and 2014, Padang remained become an efficient area, while the South Coast is no longer efficient. In 2013 and 2014, new efficient regions emerged besides Padang, West Pasaman District. For 2014, Solok district also became an efficient area. Efficient areas look exactly the same in model 2 and model 1 for each year.

IV. DISCUSSION

The standard deviation value shows a sharp grouping which can be subjectively divided into two, namely stable, areas with standard deviations below 10, and fluctuating or high fluctuations, namely regions that have a standard deviation of more than 10. Variations in efficiency scores

and standard deviations can be grouped into the following categorizations.

TABLE IV. CATEGORIES OF EFFICIENCY LEVELS AND FLUCTUATIONS IN EFFICIENCY LEVEL HEALTH SERVICES OF LOCAL GOVERNMENTS IN WEST SUMATRA 2010-2014 (MODEL 1)

Fluctuation Efficiency	Low 0 – 10	High >10
Very High (95,00 – 100)	Padang Pesisir Selatan	
High (80,00-94,99)	Limapuluh Kota	Pasaman Barat Kabupaten Solok Padang Pariaman
Midle ` (65,00-79,99)	Solok Selatan	Agam
Low (50,00 – 64,99)	Pasaman Sijunjung	Tanah Datar Bukittingi Mentawai
Very Low (< 50)	Kota Solok Padang Panjang Sawahlunto Payakumbuh Pariaman	Dharmasraya

TABLE V. CATEGORY LEVEL OF EFFICIENCY AND FLUCTUATIONS IN EFFICIENCY LEVEL HEALTH SERVICES OF LOCAL GOVERNMENTS IN WEST SUMATRA 2010-2014 (MODEL 2)

Fluctuation Efficiency	Low 0 – 10	High >10
Very High (95,00 – 100)	Padang	
High (80,00-94,99)	Pesisir Selatan	Pasaman Barat Kabupaten Solok.
Midle ` (65,00-79,99)	Agam Limapuluh Kota Pasaman	



Table 5. Cont.

Low (50,00 – 64,99)	Sijunjung Padang Pariaman Solok Selatan	Kepulauan Mentawai Bukittinggi
Very Low ( < 50)	Tanah Datar Kota Solok Payakumbuh Padang Panjang Sawahlunto Pariaman	Dharmasraya

Important changes occurred in Pasaman Regency which actually occupied the middle category in this model 2. There was an increase compared to the low category 1 model. The achievements of Pasaman Regency were made possible by the significant increase in morbidity rates from 75.4 in 2010 to 82.7 in 2013 despite the decline in other areas in West Sumatra in 2014 due to the influence of haze.

Besides that, Padang Pariaman is in this category. Whereas in model 1 is in the high category. This means that the efficiency level is reduced to two lower categories. This is due to the fact that in the short term, the output of health services in the form of health figures of its population by observing the dynamics of the movement of health centers can be said to have stagnated. The sickness rate even in 2013 and 2014 was the lowest. These results also provide a signal for the beginning of the decline in the health service system in Padang Pariaman District. While life expectancy is relatively good, the health of the population is the lowest.

South Solok Regency experienced a decline in category to be low in model 2 compared to the medium in model 1. Based on its health figures, South Solok Regency was relatively low. Health rates have high fluctuations. In model 2, the very low efficiency category is occupied by seven regions. The area is the same as model 1 with the addition of Tanah Datar Regency which decreases from the low category in model 1. Fluctuations in efficiency scores are also relative, except Tanah Datar which in model 1 fluctuates high, but in model 2 it has low fluctuations. These results confirm that the provision of health services, especially in urban areas is in the "trap of low-level health services" which requires breakthroughs and commitment to make fundamental changes in health services by optimizing the potential and opportunities in the form of relatively small population and or relative area small. Health care issues faced not only for long-term but also for short-term goals or results show worse results. While for Dharmasraya and Tanah Datar Regencies, the allocation of inputs between human resources in the form of doctors, health facilities in the form of Puskesmas and health budgets can be properly composed to achieve output efficiently.

Comparison of the average 2010-2014 efficiency score between model 1 and model 2 shows a significant change in ranks between regions. Ranking changes occur mainly in the middle and low categories. Precisely rank four to thirteen. The first to third ranks did not change for the two models, namely Padang, Pesisir Selatan and Pasaman Barat. Likewise, the 6 lowest ranks, starting from the 14th to 19th ranks were respectively Dharmasraya, Payakumbuh, Kota

Solok, Padang Panjang, Pariaman, and Sawahlunto. Comparison of rankings based on this efficiency score is presented in table 6.

TABLE VI. RANKING OF EFFICIENCY SCORE FOR LOCAL GOVERNMENT HEALTH SERVICES IN WEST SUMATRA PROVINCE BASED ON MODELS 1 AND 2

Based on Model 1		Based on Model 2	
1	Padang	1	Padang
2	Pesisir Selatan	2	Pesisir Selatan
3	Pasaman Barat	3	Pasaman Barat
4	Limapuluh Kota	4	Solok
5	Solok	5	Agam
6	Padang Pariaman	6	Limapuluh Kota
7	Agam	7	Pasaman
8	Solok Selatan	8	Kepulauan Mentawai
9	Pasaman	9	Sijunjung
10	Tanah Datar	10	Padang Pariaman
11	Bukit Tinggi	11	Solok Selatan
12	Kepulauan Mentawai	12	Bukit Tinggi
13	Sijunjung	13	Tanah Datar
14	Dharmasraya	14	Dharmasraya
15	Payakumbuh	15	Payakumbuh
16	Solok	16	Solok
17	Padang Panjang	17	Padang Panjang
18	Pariaman	18	Pariaman
19	Sawahlunto	19	Sawahlunto

The dynamics of the efficiency of health services in each region can be indicated by the mean and standard deviation. Padang City is the only area that has consistently achieved an efficient level for five years of analysis. A number of reasons can explain this performance achievement. First, the city of Padang has the highest input, but if using a weighting population, the city of Padang has the lowest health input in the form of per capita and Puskesmas health budgets per 100,000 population, while the number of doctors is not the lowest but relatively small. This indicator is reversed with the achievement of life expectancy being the lowest, while the health figure is at the highest five. This is what makes the calculation of efficiency put Padang City always efficient. These results indicate a better system of health care management in the city of Padang with the lowest input indicators, but with a higher life expectancy and health rate compared to other regions with similar budgets. This result is similar to the findings of Mirmirani et al. at the country level, namely as Albania among the Transitional Economic Countries (Eastern Europe) [8].

Second, a number of external factors other than regional health service management can explain the level of efficiency achieved by Padang City. Factors that are outside the control of local government services, exogenous, or in the DEA concept are also called environmental variables. The age of life expectancy and high health rates can also be contributed by health services provided by the government or the private sector. Padang City has a Central General Hospital, police and army hospitals, as well as private hospitals that contribute to the output of health services.

Third, external factors in the form of better economic conditions in terms of income and education can contribute

to a clean and healthy lifestyle, so that life expectancy and health rates are high. High income and education encourage consumption patterns with sufficient and / or nutritious calorie intake as a preventative aspect and immune system from disease. Adequate income and education also jointly play a role to better demand health services when facing health complaints (curative aspects) so that they have a higher life expectancy.

Henrik L. Blum as quoted by BPS in the 2013 Indonesian Human Development Index reveals that increasing public health that can be measured by population mortality and morbidity rates is influenced in this case in line with output indicators in the form of life expectancy influenced by a number of factors. He stated that there were four determinants with different contributions, namely: environmental factors (45 percent), health behavior (30 percent), health services (20 percent), and population / descent (5 percent). Therefore, analysis of population health status can be seen through these four aspects [2].

In the medium to low efficiency category areas that experience sharper fluctuations in scores and efficiency rankings and high standard deviations, inconsistent input use and achievement of inputs. The most obvious or extreme example is the Mentawai Islands District with the highest standard deviation. The efficiency score from low around 40 percent in 2010 experienced a significant increase even exceeding 90 percent in model 1 and 80 percent in model 2, but it dropped in 2014. Mentawai Islands Regency has the largest per capita health budget after Padang Panjang, even Puskesmas input per capita is the highest, but for the availability of doctors who initially decreased it actually increased faster.

A number of external factors also contribute to high fluctuations in input use in the Mentawai Islands Regency. Areas with island characteristics are not easy to access in the provision of health services. The health budget is relatively larger. The availability of adequate doctors does not guarantee an increase in service output given the accessibility to residential centers that are spread across many islands and must be taken by sea travel. Changes in the ratio of doctors also cannot be denied by reluctance in the placement of doctors or the absence of doctors in the availability of services. External factors that also cannot be ignored are events and threats of earthquake and tsunami disasters in this area and potential environmental conditions for epidemic diseases such as malaria.

The results of the calculation recognize that the level of efficiency in this study only accommodates a portion of health service inputs. A number of other important inputs are the number of nurses. Efforts to enter the input of the number of nurses are constrained by the availability and validity of the data that will potentially lead to bias in calculating efficiency. Likewise, the output indicator in the form of health figures as the opposite of the morbidity rate prioritizes services on the curative aspect. Whereas the health paradigm prioritizes preventive aspects, so this analysis also needs to take account of health extension workers, health service

provision, health checks constrained by the lack of data at the regional level.

The limitations that this research also has as reflected previously are that a number of factors outside the management of regional health services have a major influence on health output such as environmental conditions, education level, hygienic and healthy living behavior and income level of the community or household. These exogenous factors in the DEA analysis usually use two stages by making it an independent variable, while the efficiency score or efficiency level becomes the dependent variable. These limitations need to be taken into consideration in the efficiency studies of subsequent regional health services and or by similar studies.

The results of this study imply that efforts to increase regional health services are also aimed at equalizing the quality and accessibility of health services between regions. The problem of inequality in health services is a challenge not only faced by West Sumatra, but a challenge faced nationally in human development in general and the development of the health sector in particular. For this reason, regional development programs must be addressed in order to improve the quality of human life by prioritizing health development in its development policies.

Sharp inequality and fluctuations in efficiency scores in a large number of regions give signals about policy sustainability. Health development programs and health service management must continue to be monitored for implementation so that it is more directed. As affirmed in the 2013 Human Development Index that improving health services can improve basic human capabilities is one of the efforts to increase the potential of the nation which ultimately has an impact on improving human quality. If this is done with a serious commitment, hope that Indonesian people have a long and healthy life, are knowledgeable, and a decent life can be achieved [2].

## V. CONCLUSION

Based on the results of the study the conclusion that can be drawn is that the level of efficiency of inter-regional health services in the Province of West Sumatra is on average classified as low-middle in the range of 60 percent. The level of efficiency between regions shows sharp inequality in each model. Health services with short-term output (health rates) are far more unequal than long-term output (life expectancy). The calculation of the efficiency level also found that city-level regions had a relatively lower level of efficiency compared to the district area. District districts and medium efficiency categories show a large change in the use of inputs each year.

## REFERENCES

- [1] United Nations Development Programme. Human Development Report 2013. UNDP, New York, 2013.

- [2] Badan Pusat Statistik. Indeks Pembangunan Manusia Indonesia 2013. Jakarta, 2014.
- [3] A. Wiku. Sistem Kesehatan. PT. Rajagrafindo Persada. Jakarta, 2007.
- [4] H. Bruce and S.J. Peacock. Efficiency Measurement in Health and Health Care. Routledge. USA and Canada, 2008.
- [5] J. Rowena et.al. Measuring Efficiency in Health Care : Analytic Techniques and Health Policy. Cambridge University Press, New York, 2006.
- [6] Afonso, António, Ludger Schuknecht and Vito Tanzi. Public Sector Efficiency Evidence For New EU Member States and Emerging Markets. Working Paper Series No. 581. European Central Bank, 2006.
- [7] Afonso, António and Miguel St. Aubyn. Non-Parametric Approaches to Education and Health Efficiency in OECD Countries. Journal of Applied Economics. Vol VIII, No. 2, 227-246, 2005.
- [8] Mirmirani, Sam. Health Care Efficiency in Transition Economies: an Application of Data Envelopment Analysis. International Business & Economics Research Journal – February 2008 Volume 7, Number 2, Hal 47-56, 2008.
- [9] Loikkanen, Heikki A. and Ilkka Susiluoto. Cost Efficiency of Finnish Municipalities in Basic Service Provision 1994-2002. Paper for 45st Congress of the European Regional Science Association, Amsterdam, the Netherlands, 23-27 August, 2005.
- [10] Afonso, António and Sónia Fernandes. Assessing and Explaining the Relative Efficiency of Local Government: Evidence for Portuguese Municipalities, 2005.
- [11] Pusat Antar Universitas Studi Ekonomi Universitas Gadjah Mada. Metodologi Empiris Data Envelopment Analysis. Modul Pelatihan. Yogyakarta : 6-10 November, 2000.
- [12] Makmun. Efisiensi Kinerja Asuransi Pemerintah. Kajian Ekonomi Dan Keuangan, Vol. 6, No. 1. Maret. 2002.