

# FORMULATION OF INDONESIAN PUBLIC HEALTH DEVELOPMENT INDEX

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## ABSTRACT

*The objective of formulation the Indonesian Public Health Development Index (IPHDI) was to describe the successful development of public health based on composite several community-based health indicators. Cross sectional study design. The data analyzed was a combination of a nationwide survey covering Baseline Health Research (Riskesdas) 2007, National Social Economic Survey (Susenas) 2007 and the Village Potential (Podes) in 2008. Selection of appropriate indicators included in IPHDI associated with LE at birth, selected on the basis of consensus expert team. When the indicator has the RSE (relative standard error) value of less than 30% and the value was held for more than 75% of districts, then the indicator is a candidate in the calculation IPHDI. The team doing the analysis on 22 models of the combination of indicators. The number of indicators that involved between 18 to 24. These models have been made and tested for correlation weighting of life expectancy each district. Results of correlation ranged from 0.314 to 0.512 and all models have a significance value  $p < 0.001$ . The model was chosen considering the variables that are considered priorities and values of correlation. IPHDI highest value is 0.708959 (Magelang City, Central Java) and the lowest is 0.247059 (Pegunungan Bintang district, Papua). **Conclusion.** IPHDI utilization is to know district who has severe health problems, resulting in enhancement programs that have intervened, resulting in focusing the target location, and became one of the parameters for the calculation of aid allocations fairly from center to the region.*

**Key words:** health indicators, Indonesian public health development index, life expectancy

## ABSTRAK

*Untuk membandingkan keberhasilan pembangunan sumber daya manusia antar negara adalah digunakan Indeks Pembangunan Manusia (IPM). Tujuan dirumuskannya Indeks Pembangunan Kesehatan Masyarakat (IPKM) adalah untuk menggambarkan keberhasilan pembangunan kesehatan masyarakat berdasarkan komposit beberapa indikator kesehatan berbasis komunitas. Desain penelitian cross sectional. Data yang dianalisis merupakan gabungan survei berskala nasional meliputi Riset Kesehatan Dasar (Riskesdas) 2007, Survei Sosial Ekonomi Nasional (Susenas) 2007 dan Potensi Desa (Podes) tahun 2008. Pemilihan indikator yang layak masuk dalam IPKM yang berkaitan dengan UHH waktu lahir, dipilih berdasarkan kesepakatan tim ahli. Bila indikator mempunyai nilai RSE (relative standard error) kurang dari 30% dan nilai tersebut dimiliki lebih dari 75% kabupaten/kota, maka indikator tersebut menjadi kandidat dalam penghitungan IPKM. Tim melakukan analisis pada 22 model kombinasi indikator. Jumlah indikator yang terlibat antara 18 sampai dengan 24. Model-model tersebut telah dilakukan pembobotan dan diuji korelasi terhadap UHH setiap kabupaten/kota. Hasil korelasi berkisar antara 0,314 sampai dengan 0,512 dan semua model mempunyai nilai kemaknaan  $p < 0,001$ . Model yang terpilih mempertimbangkan variabel yang dianggap prioritas dan nilai korelasi. Nilai tertinggi IPKM adalah 0,708959 (Kota Magelang, Jateng) dan yang terendah adalah 0,247059 (Kab. Pegunungan Bintang, Papua). **Kesimpulan:** Pemanfaatan IPKM bisa beragam, yaitu mengetahui kab/kota yang mempunyai masalah kesehatan berat, menghasilkan penajaman program yang harus diintervensi, menghasilkan penajaman lokasi sasaran, dan menjadi salah satu parameter perhitungan alokasi bantuan pusat ke daerah secara berkeadilan.*

**Kata kunci:** Indeks pembangunan kesehatan masyarakat, indikator kesehatan, umur harapan hidup

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## INTRODUCTION

Health development should be viewed as an investment to improve the quality of human resources. In the Law No. 17/2007 on RPJPN Year 2005–2025<sup>1</sup> it is stated that in order to achieve the human resources qualified and competitive, then health, education and increasing people's purchasing power are the three main pillars to improve the quality of human resources and the Human Development Index (HDI) of Indonesia. HDI or "Indeks Pembangunan Manusia (IPM)" is one measurement tool that is considered to reflect the status of human development, so often used to compare the success of the human resources development between countries. In the paradigm of HDI, the primary focus is aimed at human development, prosperity, justice, and sustainability. The rationale of this paradigm refers to the human ecological balance and optimal goal is the optimal actualization of human potential.

HDI is a composite indicator consists of health indicators, education and economics.<sup>2</sup> Knowledge has a fundamental role for human development. In calculating the HDI, knowledge is measured by two indicators namely literacy rate and school length average (Mean Years School). Other indicator used in HDI is an indicator of decent living standards using real GDP per capita which has been adjusted. One component of the HDI is the Health Index that only one measurement used as an indicator of the health that is life expectancy (LE). Life expectancy is the estimation of population lifetime average since birth, assuming no change in mortality patterns by age. Calculating life expectancy by an indirect method, from an information of children born alive and children still alive in a certain period of time. With the help of mortality tables, the life expectancy will be obtained. The calculation is still using the indirect method because the implementation of vital registration is not optimal yet, so that changes in the vital activity of population (births, deaths and migration) could not be certainly known. Infant mortality rate (IMR) is also not used for purposes of calculating the HDI because it judged to be non-sensitive indicators for industrialized countries that have been advanced.

Based on the above matters, HDI has been used as a benchmark to assess the success of the development, so that priorities are always geared towards improving the HDI in the region. Many local

governments prioritize the three pillars of development namely: economy, education and health. For the health sector, indicator that represent the HDI is life expectancy at birth. However, when questioned further, how to increase life expectancy, it is difficult to answer with certainty. Beside, to attain life expectancy rate is also not easy because of the limited availability of registration data so that must use the indirect method. Therefore, it takes a series of other health indicators are expected to affect health and can further increase the life expectancy at birth. Health indicators can be directly and easily measured to describe life expectancy.

## METHODS

### Source data used

To develop the health indicators that support life expectancy, National Institute of Health Research and Development (NIHRD) has been implementing the Baseline Health Research (Riskesdas) in 2007 which was designed to collect data in the health field that can represent a national portrait of the region, provinces and districts. Riskesdas 2007 is one form of embodiment of the 4 (four) grand strategy of the Ministry of Health, the functioning of health information systems which is evidence-based through basic data collection and health indicators. The indicators include health status and health determinants, which is based on the concept of Hendrik L. Blum. The database which is available in Riskesdas such as health status and health determinants, both at household and individual level, with the scope as follows: (1) mortality, with verbal autopsy event of death, (2) nutritional status: children and adults, (3) communicable disease, non-communicable disease, and a history of hereditary disease, (4) disability and injury, (5) mental health, (6) food consumption at household level, (7) environmental health, (8) knowledge, attitudes, and behavior, (9) access and utilization of health services, (10) responsiveness of health services, (11) maternal and child health, immunization and growth monitoring, (12) anthropometric measurements, abdominal circumference and upper arm circumference, (13) measurement of pressure blood, (14) visual examination, (15) dental examination, and (16) biomedical examination. Design of Riskesdas 2007 is a cross sectional survey with descriptive analysis. Riskesdas data quite rich because of three

ways collected: interviews using questionnaires, physical measurements (weight, height, blood pressure), and biochemical examination. These questions are addressed to individuals should be directly interviewing individuals concerned. Questions about household information can be gathered through interviews with heads of households or household members who know the characteristics of the household. In Riskesdas 2007, population is all households in Indonesia. The sample of households and household members in Riskesdas 2007 is designed identical to the sample list of households and household members of SUSENAS 2007. All households and household members on SUSENAS sample 2007 to become sample of Riskesdas 2007. SUSENAS sample of successful re-visited by Riskesdas team in 440 districts as many as 258,446 household and individuals who successfully re-interviewed as many as 973,657 people. Riskesdas 2007 also collects 36,357 samples for measurement of various biomedical variables of household members older than 1 year old and living in villages with urban classification. In particular for the measurement of blood sugar, had been gathered as many as 19,114 samples taken from household members aged 15 years old above. Riskesdas limitations include non-random error such as: the formation of new districts, census blocks are not affordable, households are not met, the time period of data collection are different. Remarkably, for the five provinces (Papua, West Papua, Maluku, North Maluku and NTT) recently carried out in August-September 2008, while the other 28 provinces was completed in 2007. In addition, district-level estimates could not be applicable to all indicators, and biomedical data that only represent urban census blocks.

Central Bureau of Statistics (BPS) also conducted a survey of Villages Potential (Podes) and National Socio-Economic Survey (SUSENAS), which can support the establishment of health indicators. Data collected from the SUSENAS on household expenditure, social characteristics, and some related to health. Sample of SUSENAS 2007 is represent at district level which includes a sample of individuals 1,167,019 and 285,186 households in 33 provinces in Indonesia. Documenting individual or household based on interviews with the community. Podes record the entire village on human resources and health facilities. Podes survey aims to provide data

on potential and performance development in the village and its development which includes the social, economic, infrastructure and facilities, as well as the potential that exists in the village. Podes 2008 data has been collected by CBS in April-May 2008 were collected from all villages or other administrative areas such as village level in Indonesia with a total 75,410 villages (according to November 2007) were spread in 465 districts. Data collection of Podes 2008 was performed on census (complete enumeration). Field enumeration conducted through direct interviews by enumerators with village heads or designated staff or other relevant sources. Variables that can be used to study the interests of health development at village level such as facilities (hospitals, health centers, village health posts, polindes, posyandu, etc.) and health human resources (doctors, midwives, other health personnels). By using the three national community-based health data that is Riskesdas (Baseline Health Research), SUSENAS (National Socio-Economic Survey), and Podes Survey (Village Potential) then formed a composite indicator that describes the progress of health development. Those composite indicators are developed as the Indonesian Public Health Development Index (IPHDI).

### **Defining Indicators**

To select appropriate indicators included in IPHDI used the following approach. Firstly, indicators that are substantially deserve to go to be part of IPHDI, which is associated with life expectancy at birth, is chosen by consensus of the expert team. Secondly, statistical indicators that can represent the district level, in this case refer to the value of RSE (relative standard error). When the indicator has the RSE value of less than 30% and the value is held for more than 75% of districts, then the indicator is a candidate in the calculation IPHDI. This first stage of analysis produce data sets that contain the value of prevalence and the RSE of each variable based on the district. Variables were selected in 91 with a value of RSE < 30% and must be owned by at least 75% of districts for the next index analysis.

### **Developing IPHDI Alternative**

The process of development of various alternative IPHDI done through a series of meetings, both internally in NIHRD, cross-program, cross-sector, including with experts and professional organizations. It

takes approximately 1 year to formulate IPHDI. The process of formulating IPHDI continue to grow in accordance with the number of critiques, feedback and suggestions, both from the practitioners, experts and researchers in NIHRD thinking. IPHDI idea emerged after the Minister of Health (Ms. Siti Fadhillah Supari) asks the best rank of districts and provinces based on the Riskesdas results. This request raises the idea to develop a composite indicator, which can summarize the key indicators of public health. Thus based on the composite indicator can be ranked district, from the best ratings to the lowest rank. This reasoning is also consistent with the purposes of advocacy to local government district, in order to perform concentration on intervention programs in health. Given a reference throughout the Local Government District is the HDI, the composite indicator results from Riskesdas should lead to improvements of HDI, in particular health indicators namely life expectancy at birth.

To formulate IPHDI, there are many of discourses developed as follows, firstly, how to treat the numbers in the opposite direction, namely the coverage rate (the higher the percentage means the better) with the prevalence of disease (higher prevalence means more bad). So there must be converted, for its line. Secondly, treatment of prevalence rates, could be from the most simple way to the most complex way or what it is. In this case, there are 3 types of treatment of disease prevalence rate, the prevalence is only used to rank the district, so the prevalence was not taken into account. For example, the prevalence of pneumonia is much less than ARI. To be balanced, both synchronized by way of converting from 0% (lowest) to 100% (highest). Moreover, the prevalence enforced as it is. Whether or not the weighting between variables, and if there is how much weight. In the process of formulating IPHDI, there are several alternatives that without weighting, there is the weighting. Ideal values used as reference. What is the lowest prevalence to be the best reference, or it is best that there is no more disease in question? Various discourses mentioned above determine the number of alternatives that could be developed to formulate this IPHDI. Until now it has developed 22 IPHDI alternative. Variations among alternative IPHDI occur because of the type

and amount of the selected indicators. How many indicators that will be selected, some experts claim that the index of the few indicators only, while other experts claim it could be many, depending on the purpose of developing the index. There are weight and size between the indicators. There is no need to consider the weight between the indicators, but many experts recommend using weighting, because the influence of each health indicator of life expectancy are not the same. If there is then agreed weighting, the magnitude of the weights for each health indicator must also be formulated again. Treatment of the prevalence rate is only to determine the rankings, there is equivalency between the prevalence, or prevalence rate as it is enforced. The ideal number for each health indicator. For coverage, of course easily, the best is 100% and the worst is 0%. But for the prevalence of disease how to specify this? What is the best means non ARI? It is unlikely that residents of the district which suffered non ARI. Differences determining the ideal number of IPHDI gives the empirical and theoretical value. Empirical IPHDI when the ideal number of prevalence of disease is taken very low number, while the theoretical IPHDI when disease prevalence equal to 0% in other words there is no disease.

All the alternatives that exist IPHDI then performed using correlation with life expectancy at birth. Alternative IPHDI which has the highest correlation is the best, so that was selected as the definitive IPHDI.

## RESULTS

Based on the method that has been determined, the analysis is carried out on 22 model combinations of indicators. The number of variables involved between 18 to 24. The models are weighted and tested for correlation against life expectancy in each district. Results of correlation ranged from 0.314 to 0.512 and all models have a significance value  $p < 0.001$ . The model was chosen considering the variables that are considered priorities and values of correlation.



**Table 1.** The chosen combination model of indicators considered priorities and values of correlation

Alternative	Indicators	Weight	Prevalence	r	Expln	Reason
1	18	(+)	model A		abort	The prevalence/proportion is only used for ranking
2	18	(-)	model B	0.455		
3	18	(-)	model B	0.429		
4	12	(-)	model B	0.449		
5	18	(-)	model B	0.406		
6	12	(+)	model B	0.398		
7	18	(+)	model B	0.292		
8	20	(+)	model C	0.449		
9	21	(+)	model C	0.446		
10	21	(+)	model C	0.439		
11	22	(+)	model C	0.436		
12	20	(+)	model C	0.438		
13	24	(-)	model A		abort	The prevalence/proportion is only used for ranking
14	20	(-)	model A		abort	The prevalence/proportion is only used for ranking
15	20	(-)	model A		abort	The prevalence/proportion is only used for ranking
16	20	(+)	model C	0.489		
17	20	(+)	model C	0.496		
18	20	(+)	model C		abort	Indicators of malaria and tuberculosis are unrepresentative for the district
19	24	(+)	model C	0.505		
20	24	(+)	model C	0.512		
21	24	(+)	model C	0.505		
22	24	(-)	model C	0,505		

The last 4 (four) alternatives using the same indicators, but the differences are:

- Alternative 19: Ratio of physician/average of health center population and the ratio of midwives/average villager.
- Alternative 20: Ratio of physician/health center and the ratio of midwives/village.
- Alternative 21: Ratio of physician/population and ratio of midwife/population.
- Alternative 22: Ratio of physician/population ratio and the midwife/resident.

#### Determination of selected IPHDI

To determine which model will be chosen to be IPHDI, used health indicators life expectancy at birth time as a golden standard. Life expectancy is an indicator of the health component in the HDI/IPM (*Indeks Pembangunan Manusia*). Alternative or model which has correlation value (r) is best used with a life expectancy as IPHDI determination selected.

IPHDI model involving 24 variables selected by involving the ratio of physician/health center and the ratio of midwives/village. Correlation values

obtained from this model is 0.512. Details of these variables with operational definitions as follows. *Toddler malnutrition and underweight*, this indicator is a comparison of weight and age. Bad category if it has a value of Z score less than -2 SD. Less category if it has a value of Z score less than -3 SD. *Toddlers short and very short*, this indicator is a comparison of height and age. Short category if it has a value of Z score less than -2 SD. Very short category if it has the value of Z score less than -3 SD. *Toddler thin and very thin*, this indicator is a comparison of height and weight. Thin category if it has the value Z score less than -2 SD. Very thin category if it has the value of Z score less than -3 SD. *Access to water*, this indicator is about water use per capita in the household. Good category if household uses minimum 20 liters per person per day. *Access to sanitation*, this indicator is about using its own toilet facilities and type of septic tank. *Weighing children under five*, this indicator for toddlers who weighed in last 6 months. It is assumed “good” if weighed 1–3 times. *Neonatal 1<sup>st</sup> Visits*, this is refers to infants under 12 months of age who received health care at 1–7 days after birth.

*Complete immunization*, it is about immunization of children aged 12–23 months obtained. It is assumed “complete” if the child has been immunized BCG 1 time, and at least 3 times DPT and at least 3 times Polio and 1 times the measles. *The ratio of physician*, this indicator is a comparison of the number of physicians per health center. It is assumed “good” if a minimum ratio of 10 doctors per health center. *The ratio of midwives*, this indicator is a comparison of the number of midwives per village. It is assumed “good” if a minimum ratio of three midwives each health center. *Delivery by health personnels*, it means the first health personnel who help in childbirth with toddlers as the unit of analysis. The health personnels are doctors, midwives, and paramedics. *Overweight children under five years*, this is a comparison of weight and height. Children are assumed as “overweight” if they have a Z score value above 2 SD. *Diarrhea*, it means people who are diagnosed diarrhea or have symptoms of diarrhea in the last 1 month. *Hypertension*, this is about population aged 15 years old above and were examined systole-diastole during the data collection.

It is assumed “Hypertension” if the systolic is greater equal to 140 mmHg or the diastole is greater equal to 90 mmHg. *Pneumonia*, it is about population who diagnosed pneumonia or experiencing symptoms of pneumonia in the last 1 month. *Handwashing behavior*, it is a habits of the population aged 10 years old above washing hands with soap. It is assumed “Good habits” if washing hands with soap at the time before eating and before preparing food and after handling animals (birds, cats, dogs). *Mental health*, it is based on the scores of SRQ questions. Mental health is categorized “disturbed” if it has a score 6 or above. *Smoking behavior*, the habit of smoking or chewing tobacco during the last 1 month. It categorized as “bad habit” if done every day or occasionally. *Oral health*, it is about population who have problems with teeth and or mouth in the last 12 months. *Asthma*, this means population who had been diagnosed with asthma by health personnel or experiencing symptoms of asthma. *Disability*, population aged 15 years old and above who have at least one limitation and or need help. *Injury*, population who have had injuries in

**Table 2.** Health indicators used and value of weight

VARIABLE	INDICATOR	WEIGHT
Prev. children < 5 y.o malnutrition and underweight	Absolute	5
Prev. children < 5 y.o are very short and short	Absolute	5
Prev. children < 5 y.o are very thin and thin	Absolute	5
Access to clean water	Absolute	5
Access to sanitation	Absolute	5
Coverage of children < 5 y.o weighing	Absolute	5
Coverage of neonatal examination	Absolute	5
Coverage of complete immunization	Absolute	5
The ratio of physician/health center	Absolute	5
The ratio of midwives/village	Absolute	5
Delivery coverage by health personnel	Absolute	5
Overweight children < 5 y.o	Important	4
Diarrhea	Important	4
Hypertension	Important	4
Pneumonia	Important	4
Proportion of handwashing behaviour	Important	4
Prevalence of mental disorder	Need	3
Proportion of daily smoking behavior	Need	3
Prevalence dental and mouth disease	Need	3
Prevalence of asthma	Need	3
Prevalence of disability	Need	3
Prevalence of injury	Need	3
Prevalence of joint disease	Need	3
Prevalence of ARI	Need	3

the last 12 months so that their daily activities were disrupted. *Hinge*, population aged 15 years old and above who were diagnosed with joint disease/arthritis/rheumatism or had experienced symptoms of joint pain/arthritis/rheumatism by health personnel. *ARI*, population who have been diagnosed suffering from ARI or experiencing symptoms of respiratory illness by health personnel.

Step-by-step analysis of 24 variables are as follows, firstly, calculation of empirical values. This is conducted an equalization of coverage conditions with the value of the disease prevalence or health status. On the coverage variable, value is in accordance with the result of the analysis. The higher value, the coverage is the better. In the variable of the disease prevalence or health status, it is conducted an equalization by using the formula 100-digit prevalence. Thus the prevalence of these has the same meaning with the coverage that the higher the value of the variable prevalence is the better. Secondly, for the workforce

was done calculation for the ratio of doctors per health center and the ratio of midwives per village. Value percent each variable that has been carried an equalization was multiplied by the weight. The absolute indicator group is multiplied by weight of 5, the important indicator group is multiplied by weight of 4, while the need indicator group to be multiplied by weight of 3. The multiplication results are sorted into empirical value. The higher the value is the better.

After obtaining empirical values to obtain the value of the index, it is need to do a calculation of theoretical value. To obtain the theoretical value, based on the coverage, the worst value equal to 0 and the best value equal to 100. On the prevalence, the worst value equal to the lowest real value after adjusted and best value equal to 100. On the ratio, the worst value for physicians equal to 0 and the best value equal to 10. For midwives, the worst value equal to 0 and the best is equal to 3.

**Table 3.** The empirical value and conversion

Variable		Empirical	Conversion
1. Children < 5 y.o malnutrition & underweight	Prevalence	39,667	60,332
2. Children < 5 y.o short & very short	Prevalence	63,872	36,127
3. Children < 5 y.o thin & very thin	Prevalence	20,052	79,948
4. Acces to water	Coverage	20,033	20,033
5. Acces to sanitation	Coverage	13,863	13,863
6. Children < 5 y.o weighing	Coverage	69,417	69,417
7. Neonatus 1 <sup>st</sup> visited	Coverage	64,706	64,706
8. Complete immunization	Coverage	14,316	14,316
9. Ratio of physician	Ratio	1	1
10. Ratio of midwives	Ratio	0,812	0,812
11. Delivery by health personnel	Coverage	73,607	73,607
			433,349*5 = 2.166,745
1. Children < 5 y.o overweight	Prevalence	15,181	84,819
2. Diarrhea	Prevalence	4,618	95,382
3. Hypertension	Prevalence	92,337	7,663
4. Pneumonia	Prevalence	1,153	98,847
5. Handwashing behaviour	Coverage	12,314	12,314
			299.025*4 = 1.196,100
1. Mental disordes	Prevalence	14,108	85,892
2. Smoking behaviour	Prevalence	28,646	71,354
3. Dental & mouth health	Prevalence	27,579	72,420
4. Asthma	Prevalence	2,374	97,625
5. Disability	Prevalence	13,342	86,657
6. Injury	Prevalence	4,283	95,717
7. Hinge	Prevalence	35,351	64,648
8. Prevalence of ARI	Prevalence	41,203	58,796
			633.109*3 = 1.899,327
			5.262,172

**Table 4.** The teoritical value

Variable	The best	The worst		
1. Children < 5 y.o malnutrition & underweight	100	10		
2. Children < 5 y.o short & very short	100	10		
3. Children < 5 y.o thin & very thin	100	10		
4. Acces to water	100	0		
5. Acces to sanitation	100	0		
6. Children < 5 y.o weighing	100	0		
7. Neonatus 1 <sup>st</sup> visited	100	0		
8. Complete immunization	100	0		
9. Ratio of physician	10	0		
10. Ratio of midwives	3	0		
11. Delivery by health personnel	100	0		
	913	$913 * 5 = 4565$	30	$30 * 5 = 150$
12. Children < 5 y.o overweight	100	10		
13. Diarrhea	100	10		
14. Hypertension	100	5		
15. Pneumonia	100	5		
16. Handwashing behaviour	100	0		
	500	$500 * 4 = 2000$	30	$30 * 4 = 120$
17. Mental disordes	100	10		
18. Smoking behaviour	100	10		
19. Dental & mouth health	100	20		
20. Asthma	100	30		
21. Disability	100	20		
22. Injury	100	30		
23. Hinge	100	30		
24. Prevalence of ARI	100	40		
	800	$800 * 3 = 2400$	190	$190 * 3 = 570$
		8965		840

**Table 5.** The top-20 rank and the lowest-20 rank of districts by IPHDI calculation

Rank	Districts	IPHDI	Rank	Districts	IPHDI
1	Magelang City	0,708959	421	Mandailing natal	0,359507
2	Gianyar	0,706451	422	East Sumba	0,357076
3	Salatiga City	0,704497	423	Murung Raya	0,352756
4	Yogyakarta City	0,694835	424	Jeneponto	0,350624
5	Bantul	0,691480	425	Nias	0,333381
6	Sukoharjo	0,685481	426	Sampang	0,327692
7	Sleman	0,680316	427	West Manggarai	0,321211
8	Balikpapan City	0,680142	428	Jayawijaya	0,314795
9	Denpasar City	0,679631	429	Tolikara	0,302086
10	Madiun City	0,678957	430	Mamasa	0,301325
11	Metro City	0,672752	431	Mappi	0,299731
12	Badung	0,672242	432	Asmat	0,295536
13	Tabanan	0,663828	433	East Seram	0,294741
14	Medan City	0,659259	434	Yahukimo	0,292974
15	Batu City	0,658937	435	South Nias	0,291263
16	Kuningan	0,656839	436	Paniai	0,288243
17	Jambi City	0,656550	437	Manggarai	0,283220
18	Pasuruan City	0,656258	438	Puncak Jaya	0,282181
19	South Jakarta	0,655481	439	Gayo lues	0,271275
20	Mojokerto City	0,653035	440	Peg. Bintang	0,247059



Summarize the theoretical value of all variables in each group of indicators. The sum is to group the worst value and the best value groups. After each group was calculated, then multiply the weight of each group of indicators such as the absolute, important, and need. This multiplication was performed for each group of the worst and the best value groups. Therefore, it is acquired the worst theoretical value from the results of the worst group and get the best theoretical value from the results of the best group.

The next stage to attain the index value are as follows:

$$\text{Indeks} = \frac{(\text{empirical value} - \text{the worst value})}{(\text{the best value} - \text{the worst value})}$$

Based on IPHDI value, the rank of districts across Indonesia could be made, from the best to the worst. List of the top-20 rank and the lowest-20 rank of the 440 districts in Indonesia based on the IPHDI calculation could be seen on the table 5.

It appears that the highest value is 0.708959 IPHDI (Magelang City, Central Java) and the lowest is 0.247059 (Pegunungan Bintang District, Papua).

## DISCUSSION

IPHDI also has weaknesses that the indicator used is limited by the available indicators on Riskesdas and information sources from other surveys. It would be different if the idea came before Riskesdas, so the indicators can be determined from the beginning then it will be more complete. Ideal condition made for IPHDI is theoretically ideal, which could not be done entirely by the district.

The important aspect of this study is the formation of Indonesian Public Health Development Index which is a composite variable. This index could describe the ranking of the 440 districts that has never existed in Indonesia.

Implications of IPHDI uncover health problems in each district so that the program interventions become more obvious and focus. This finding is useful also for the allocation of funds from the center to the regions based on justice. However, it should be remembered that the health indicators used in this calculation is not perfect yet. IPHDI could be improved by calculating the rate of prevalence for several diseases as an indicator and to formulate other indicators to complement IPHDI calculation.

Other research which relate to this paper is a study conducted by Abdesslam in 2006 (Abdesslam Boutayeb, Mansour Serghini). He examines the health indicator and its relationship with the HDI in the Arab countries. Unlike IPHDI study developed in Indonesia, where using Pearson Correlation method in the calculation of relative standard error (RSE), then the study in this Arab countries using Principal Component Analysis (PCA). Indicators used in IPHDI of 24 indicators, whereas in Abdesslam's study using 11 health indicators, namely life expectancy at birth, expectation of lost healthy, maternal mortality ratio, delivery attended by skilled attendant, pregnant women who received prenatal care, the weight of children under < 5 y.o, infant mortality rate, number of physician per 100,000 people, HDI rank, literacy, enrollment of school. IPHDI use many variable factors because they want to know whether that can increase life expectancy. For example, the indicator ratio of doctors, Abdesslam using the ratio of doctors per population, while IPHDI using the ratio of doctors per health center. This is due to the geographical influence in Indonesia, where if the area is very spacious but the number of people slightly, for example: Papua Province. IPHDI compare the ranks among 440 districts, while Abdesslam comparing the 19 states in the Arab region. In Indonesia study yielded IPHDI composite indicator which provides a ranking of districts with health problems respectively, while the result obtained Abdesslam's study described the relationship between the health indicators and human development in the Arab world. Indicators related most closely to the human development index in the Arab countries are maternal and infant mortality.

## CONCLUSION

IPHDI is expected to clarify the issue of health in each region, so that intervention programs could be more focus. Based on indicators that are in IPHDI, the utilization can be varied. In terms of health regions, using IPHDI indicators as a whole, will result in districts that have a severe or complex health problem. Then based on health indicators in IPHDI at district, will produce a focus in the program that should be intervened. From the stake holder, using one of the indicators in IPHDI, will produce a converge in the location of targeting district. In terms of allocation of central assistance to the region, IPHDI can be used

as one of the parameters/criteria for calculating the allocation of central assistance to the district as a justice.

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