Feasibility of The Special Index for Handling Stunting (IKPS) as an Indicator of Government Performance in Stunting Management in Indonesia

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Background: *Stunting is a crucial issue in the 2024-2029 presidential election, as its resolution is key to achieving a Golden Indonesia vision by 2045. Addressing stunting has become a primary agenda for the Indonesian government, as outlined in the 2020-2024 National Medium-Term Development Plan. The President has instructed Statistics Indonesia to develop a measurement for stunting, namely IKPS. No studies have evaluated the suitability of IKPS as a performance measurement tool. This study aimed to assess the feasibility of IKPS as a government performance indicator in addressing stunting in Indonesia.*
Method: *This Cross-sectional study utilized secondary data from IKPS. Stunting prevalence data for 2018 and 2019 were sourced from the combined Indonesian Toddler Nutritional Status Study and the 2019 National Socioeconomic Survey. Data analysis included descriptive statistics, correlation tests, simple regression analysis, and quadrant analysis to measure relationships and effects between the variables.*
Result*: No significant relationship was found between IKPS and stunting prevalence (r=-0.092, p-value=0.593), though a strong and significant correlation was observed between changes in IKPS and stunting prevalence (r=-0.467, p=0.005).*
Conclusion: *The relationship pattern was unexpected, showing a negative linear association in which increased IKPS did not effectively reduce stunting prevalence. These findings highlight the need for a valid IKPS for program planning, evaluation, and decision-making and suggest further research on IKPS construction methodology.*
Keywords: *Composite indicators, Correlation, Index, Performance measurement, Stunting*

Kelayakan Indeks Khusus Penanganan Stunting (IKPS) Sebagai Indikator Kinerja Pemerintah dalam Penanganan Stunting di Indonesia

Latar Belakang: *Stunting menjadi salah satu isu krusial dalam pemilihan calon presiden 2024-2029 karena menjadi kunci dalam mencapai Indonesia Emas 2045. Penanganan stunting menjadi agenda utama pemerintah Indonesia sebagaimana tercantum dalam RPJMN 2020-2024, dan Presiden menginstruksikan BPS untuk membuat alat ukur kinerja stunting yaitu IKPS. Hingga saat ini belum ada penelitian yang mengevaluasi kelayakan IKPS sebagai instrumen pengukuran kinerja. Penelitian ini bertujuan untuk menilai kelayakan IKPS sebagai salah satu indikator kinerja pemerintah dalam menangani stunting di Indonesia.*
Metode: *Penelitian Cross-sectiona ini menggunakan data sekunder dari IKPS. Data prevalensi stunting untuk tahun 2018 dan 2019 diperoleh dari penggabungan Studi Status Gizi Balita Indonesia (SSGBI) dan Survei Sosial Ekonomi Nasional (Susenas) 2019. Analisis data meliputi analisis statistik deskriptif, uji korelasi, analisis regresi sederhana, dan analisis kuadran untuk mengukur hubungan dan pengaruh antara kedua variabel.*
Hasil*: Tidak terdapat hubungan yang signifikan antara IKPS dengan prevalensi stunting (r=-0,092, p-value=0,593 namun hubungan yang kuat dan signifikan ditemukan antara perubahan IKPS dan perubahan prevalensi stunting (r=-0,467, p=0,005).*
Kesimpulan*: Pola hubungan tersebut tidak seperti yang diharapkan, mengingat hasil pola hubungan tersebut ternyata bersifat linier negatif, yaitu peningkatan IKPS menurunkan keberhasilan penurunan prevalensi stunting. Hasil tersebut menunjukkan pentingnya IKPS yang valid untuk perencanaan, evaluasi, dan pengambilan keputusan program, serta menyarankan penelitian lanjut pada metodologi penyusunan IKPS.*
Kata kunci*: Indeks, Indikator komposit, Korelasi, Pengukuran kinerja, Stunting*

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INTRODUCTION

To achieve Golden Indonesia 2045, a superior generation must be prepared 18 years earlier.[1] Indonesia will receive a demographic bonus in 2045, where the productive age group will be higher than the non-productive age group. Therefore, to achieve maximum economic benefits, the quality of human resources must be prepared. One of the threats of the demographic bonus is stunting.[2] It is not surprising that stunting is being raised intensively and has become an essential issue in the election of presidential and vice-presidential candidates for 2024-2029 because, during this government term, it is critical to achieving a Golden Indonesia 2045. Stunting is the failure of children under the age of five to grow due to long-term malnutrition. Stunting impacts cognitive development, resulting in low school performance and, in the long run, reduces potential productivity and lowers income by 21%.[3–5]

By 2020, 22% of the world's children, or 149.2 million children under five, will be stunted.[6,7] Reducing the prevalence of stunting in children is one of the World Health Assembly's (WHA) global nutrition targets; a 40% reduction in the prevalence of stunting by 2025 as well as a target indicator in the 2030 Sustainable Development Goals (SDGs), a 50% reduction by 2030.[6,7] The prevalence of stunting in Indonesia has remained high for several decades. Data from 2022 show that the prevalence of stunting is 21.6%.[5,8,9] Overcoming stunting is a top priority, as is reducing the global disease burden and promoting economic development. The President of the Republic of Indonesia has set a target to reduce the prevalence of stunting to 14% by 2024 for a reduction of 7.6% in two years from 2022. However, the decline in stunting prevalence was only 3.3 % in the two years between 2019 (27.7 %) and 2021 (24.4 %).[8]

To achieve this target, the Government showed a high commitment by issuing Presidential Regulation Number 72 of 2021 concerning the Acceleration of Stunting Reduction, and the President formed the Stunting Reduction Acceleration Team (TPPS), which the Vice President of the Republic of Indonesia directly leads. Stunting is the main agenda of the Government of the Republic of Indonesia, as stated in the National Medium Term Development Plan (RPJMN) 2020-2024. The President assigned the Central Bureau of Statistics to create a measure that describes the Government's performance in handling stunting, known as the Special Index for Handling Stunting (IKPS).[10] The preparation of the IKPS is also a target of the cooperation agreement between the Indonesian Government and the World Bank on a soft loan in the form of *Program for Results* amounting to US$400 million, of which the Government is obliged to report the IKPS twice.[10]

IKPS is a composite indicator compiled from several dimensions and indicators that affect the occurrence of stunting. Twelve indicators describe the achievements of stunting interventions and are grouped into six dimensions, namely the dimensions of Food, Nutrition, Housing, Health, Education, and Social Protection. IKPS is a basis for planning and evaluating government performance and policy making, including budget allocation by the central government, regional government, and related institutions.[11] A *good performance* is a high IKPS value, which means that the coverage of interventions to overcome stunting is good and can reduce the prevalence of stunting. The IKPS has been refined several times during its development. However, there has yet to be an evaluation of IKPS as an appropriate tool to measure stunting prevention performance.

Research related to the IKPS still needs to be completed, covering only the use of IKPS data and the relationship between IKPS and other variables. The use of IKPS for policymaking related to stunting still needs to be improved, even though IKPS can determine program targets, budget and resource allocation, stakeholder analysis, cooperation with other parties, and further analysis.[12] Krisnawati [13], in her research using IKPS data, recommends that the government intervene to reduce stunting more effectively by referring to the performance achievements contained in the IKPS indicators. Then, Muhafidin [14], in his research in West Java, informed strategies to overcome stunting by improving programs covered in the six dimensions of IKPS. In addition, Suraya and Wijayanto [15] researched the best clustering method to determine priority areas using five of the six dimensions of IKPS as analysis material. Moreover, IKPS, as presented in a policy brief, is expected to be

used by central and regional governments as a reference in implementing stunting programs.[12]

Meanwhile, several researchers analyzed the relationship between IKPS and other indicators. Bachtiar[16], for example, examined the association of one indicator of IKPS's dimensions, exclusive breastfeeding, with the prevalence of stunting. Kusrini [17] measured the correlation between the Global Hunger Index at the subnational level with IKPS. The BPS [10] examines the relationship between IKPS and several other variables, i.e., percentage of poor population, human development index, and health and education facilities. Until this paper, studies have not examined the relationship of IKPS with the prevalence of stunting. Thus, this study examines the relationship between IKPS and the prevalence of stunting in 34 provinces and measures how much influence IKPS has on the prevalence of stunting. This study also assesses the success of provinces in implementing the program through quadrant analysis. Furthermore, this study investigates possible methodological errors in constructing IKPS as they may lead to misinterpretation of policy messages. This research is essential to provide scientific evidence on whether the IKPS is an appropriate tool for evaluating the performance of stunting management programs in Indonesia.

METHOD

This quantitative research uses descriptive statistical analysis methods, simple regression analysis and correlation, and quadrant analysis. This Cross sectional study uses secondary data from Statistics Indonesia, that is, IKPS data for 2018 and 2019 [11] and data on the prevalence of stunting for 2018 and 2019. The stunting prevalence for 2019 results from integrating the Indonesian Toddler Nutritional Status Study (SSGBI) and the National Socioeconomic Survey (Susenas) 2019.[18] The study took data in 2018 and 2019 because the completeness of the two variables was only available in these two years, while data from 2020 onwards still needed to be completed for the two variables. Apart from that, the data for 2018 and 2019 reflect the general situation because after that, in 2020, the COVID-19 pandemic hit and caused a disruption in the whole system, both in the health system and in the economy and food system. The disruption leads to a decrease in the coverage of health services, as planned activities cannot be carried out due to social restrictions and population mobility, including changes in people's consumption patterns, causing a bias in the measurement.[4,19,20]

In this study, IKPS is the independent variable, while stunting prevalence is the dependent variable—data processing of correlation and simple regression statistical tests using SPSS. The descriptive measures used are minimum, maximum, and average—correlation analysis to measure the closeness of the relationship between selected variables. If the correlation coefficient is close to +1 or -1, it indicates a perfect linear relationship between two variables. On the other hand, if the correlation coefficient is close to 0, there is almost no relationship between the two measured variables. The level of correlation coefficient relationship with the following parameters is 0.00-0.19; the correlation relationship is not very strong; 0.20-0.39, the correlation relationship is not strong; 0.40-0.69, the correlation relationship is quite strong; 0.70-0.89, strong correlation relationship, 0.90-0.99 solid relationship.[21] Statistical significance is indicated by a p-value <0.05 and highly significant if the p-value <0.01; conversely if the p-value > 0.05 is not considered statistically significant.[22] Simple regression analysis assesses the effect of the independent variable on the dependent variable through the equation $Y = a + b$.

We performed a quadrant analysis on the variables of change in IKPS values and stunting prevalence. The data used is the difference between the two years. In the IKPS change variable, the change value is the difference between the 2019 IKPS value and 2018 values, given the expectation that the IKPS will increase annually. In contrast, for the variable that measures the change in stunting prevalence, the change value is the difference between the stunting rates in 2018 and 2019, given that stunting prevalence will decrease yearly.

RESULTS

This study examines the feasibility of the IKPS as an indicator of government performance in handling stunting as measured by statistical tests and quadrant analysis.

Statistical Test

Descriptive statistics show that nationally, the increase in IKPS from 2018 to 2019 range from

1.93, with the highest increase of 4.54 and the lowest was -1.26. The minus sign means that there was no performance increase but a decrease. Meanwhile, for changes in stunting prevalence, nationally, there was an average decrease in prevalence of 2.31, with the highest decrease of 9.17 and the lowest of -4.53. The minus sign on this variable means there is no decrease in stunting prevalence but an increase.

The correlation test between IKPS and Stunting shows a correlation coefficient of 0.095 (2019) and 0.276 (2018), meaning that there is a very weak correlation or not strong correlation between the IKPS value and the Prevalence of Stunting in both years (Table 1.). Statistically, the relationship between these two variables is not significant.

Table 1. Descriptive Statistics, Normality Test, Correlation and Regression Test IKPS with Stunting

Variable	Descriptive statistics			Normality test		Correlation and Regression Test		
	Min	Max	Mean	Sig.	Shapiro-Wilk	Sig.	Pearson Correlation	R^2
IKPS 2019	41,70	79,94	63,21	0,170	0,955	0,593	-0,095	0,009
Stunting 2019	14,42	43,82	27,96	0,822	0,982			
IKPS 2018	40,01	78,54	61,28	0,076	0,943	0,114	-0,276	0,076
Stunting 2018	17,60	42,70	30,26	0,580	0,974			
Increase in IKPS 2018-2019	-1,26	4,54	1,93	0,432	0,969	0,005	-0,467*	0,218
Decreased prevalence of stunting 2018-2019	-4,35	9,17	2,31	0,643	0,976			

*. Correlation is significant at the 0.01 level (2-tailed)

These results show differences when the test uses variables of IKPS change and stunting change. The correlation test shows a correlation coefficient of 0.467, which indicates a reasonably strong correlation relationship and statistically has a significant relationship (p-value 0.005) with a negative linear relationship pattern. In this test, the coefficient of determination (R square) is 0.218 with the regression model equation of stunting change = 4.33-1.05 * IKPS change (Figure 3).

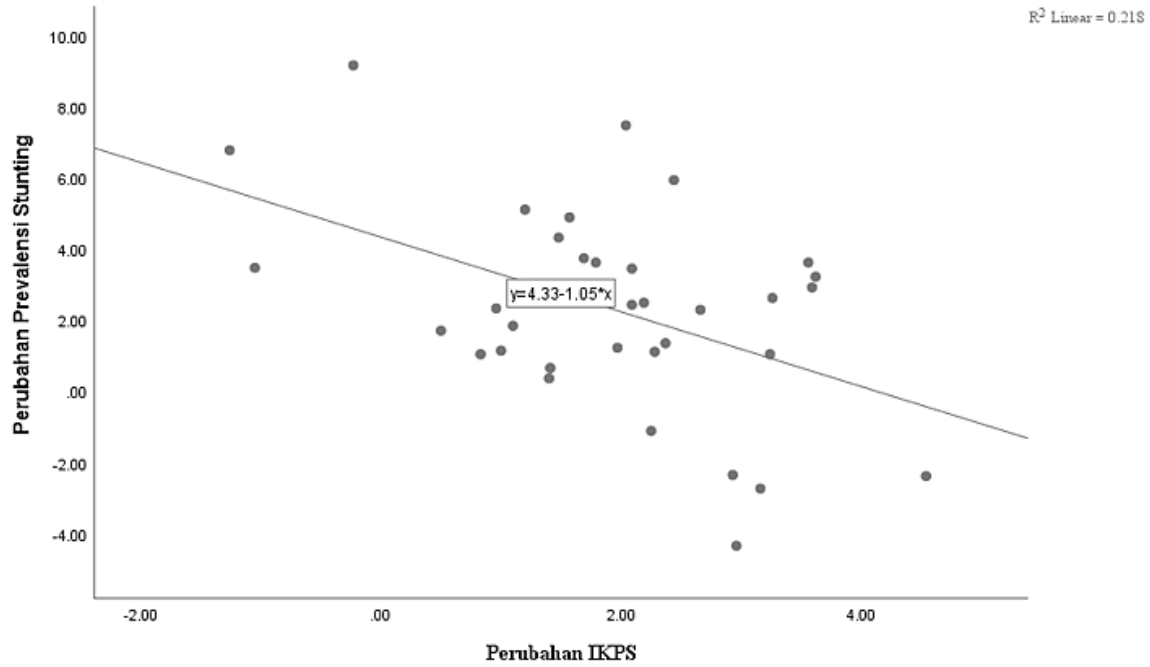

Figure 1. Linear Regression Model of Changes in IKPS and Changes in Stunting Prevalence in 2018-2019

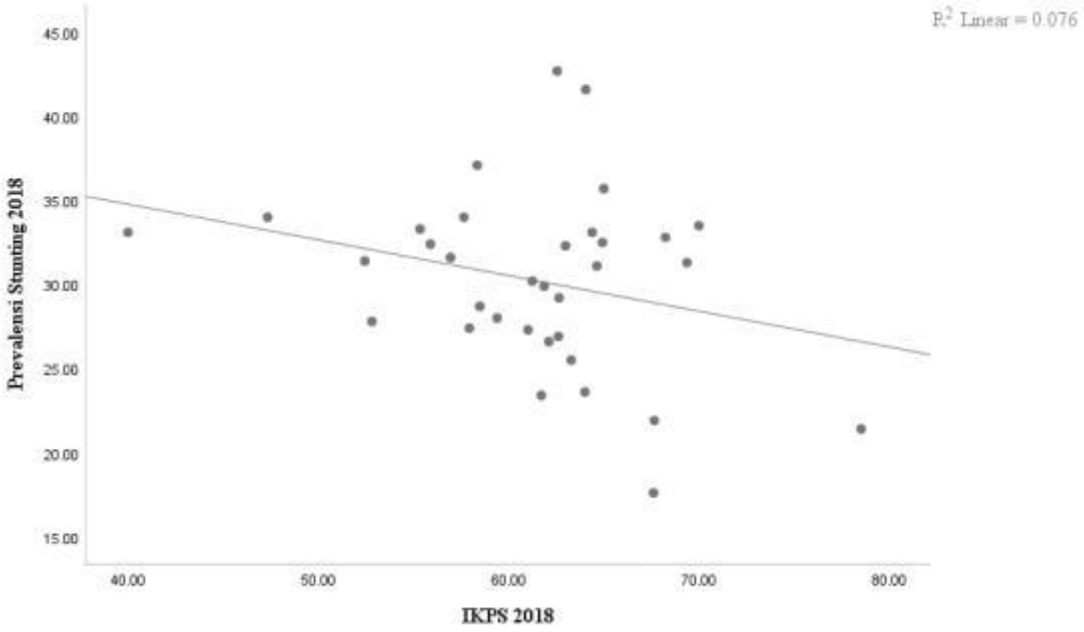

Figure 2. Linear Regression Model of IKPS and Stunting Prevalence in 2018

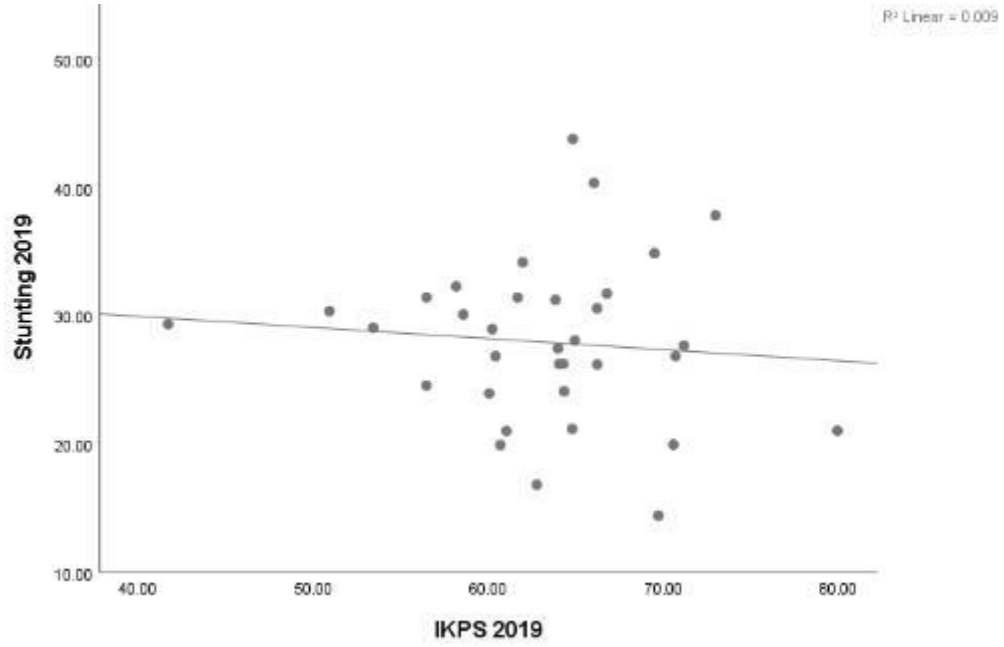

Figure 3. Linear Regression Model of IKPS and Stunting Prevalence in 2019

IKPS

IKPS combines six dimensions and 12 indicators (Table 2). Based on the document study, the IKPS construction uses the minimum-maximum normalization method for each indicator and uses equal weighting for each constituent dimension.

Table 2. Dimensions, Indicators, and Methods of IKPS' Construction

Dimensions	Indicator	Normalization		Weighting
		Min	Max	*Equal weighting*
Health	1. Immunization	0	90	1/6
	2. Birth assistance by health workers at Health Facilities	0	100	
	3. Family planning	0	80	
Nutrition	4. Exclusive breastfeeding	0	80	1/6
	5. Complementary Food (MP) for breast milk	0	80	
Food Access	6. Experiencing food insecurity	0	60	1/6
	7. Insufficient food consumption	0	60	
Housing	8. Decent Drinking Water	0	100	1/6
	9. Proper Sanitation	0	100	
Social Protection	10. Utilization of Health Insurance	0	80	1/6
	11. KPS/KKS recipients	0	80	
Education	12. Early Childhood Education (PAUD)	0	90	1/6

Source: Special Index Report for Handling Stunting (IKPS) 2020 [10]

Quadrant Analysis

Quadrant Analysis divides 34 provinces into four quadrants with the average value as a counterweight. Table 3 compares the distribution of provinces in the four quadrants based on the IKPS and Stunting prevalence variables in 2018 and 2019, and the variable changes in IKPS and stunting during 2018-2019. The red letters in the table indicate provinces with a stunting prevalence higher than the national average. Quadrant 1 is provinces with stunting prevalence and IKPS scores above the national average; quadrant 2 is provinces with stunting prevalence above the national average and IKPS scores below the national average; quadrant 3 is provinces with stunting prevalence and IKPS scores below the national average; quadrant 4 is a province with prevalence below the national average and IKPS scores above the national average. Using both variables, the distribution of provinces with above-average stunting prevalence is only in quadrants 1 and 2. Similarly, the distribution of provinces where the prevalence of stunting is below the national average is only in quadrants 3 and 4, and this result applies to both years (2018 and 2019).

Table 3. Quadrant Analysis of Distribution of 34 Provinces

QUADRANT	IKPS and Stunting 2018	IKPS and Stunting 2019	Change on IKPS & Stunting 2018-2019
QUADRANT 1	• East Nusa Tenggara • West Nusa Tenggara • West Sulawesi • South Kalimantan • Central Sulawesi • South Sulawesi • Gorontalo • West Java • East Java • Central Java	• East Nusa Tenggara • West Nusa Tenggara • West Sulawesi • South Kalimantan • Central Sulawesi • South Sulawesi • Gorontalo • East Kalimantan	• Bali • East Java • West Sumatra • Riau • Banten • West Papua • Aceh • Maluku • South Sumatra
QUADRANT 2	• Aceh • Papua • Maluku • North Maluku • Central Kalimantan • North Sumatra • South Sumatra • West Kalimantan	• Aceh • Papua • Maluku • North Maluku • Central Kalimantan • North Sumatra • South Sumatra • West Kalimantan • Southeast Sulawesi	• Jambi • Kep. Riau • West Java • North Sulawesi • Central Java • Kep. Bangka Belitung • South Sulawesi • Papua • North Maluku
QUADRANT 3	• Bengkulu • Jambi • Riau • West Papua • Lampung • Southeast Sulawesi	• Bengkulu • Jambi • Riau • West Papua • Kep. Riau • Kep. Bangka Belitung	• Bengkulu • In Yogyakarta • North Kalimantan • West Kalimantan • Central Kalimantan • Central Sulawesi
QUADRANT 4	• Bali • DKI Jakarta • In Yogyakarta • North Sulawesi • Banten • North Kalimantan • West Sumatra • Kep. Riau • Kep. Bangka Belitung • East Kalimantan	• Bali • DKI Jakarta • In Yogyakarta • North Sulawesi • Banten • North Kalimantan • West Sumatra • Lampung • West Java • East Java • Central Java	• DKI Jakarta • Lampung • North Sumatra • South Kalimantan • West Sulawesi • East Kalimantan • East Nusa Tenggara • Gorontalo • Southeast Sulawesi • West Nusa Tenggara

The quadrant distribution shows that achieving a high level of performance in the stunting program does not affect the position category. This result is in line with the results of the statistical analysis, where the correlation test between the IKPS variable and the prevalence of stunting is very weak, with a correlation coefficient value (Pearson correlation) of 0.095 (2019) and 0.276 (2018) and statistically, this relationship is not significant (Table 1). Therefore, using stunting prevalence and IKPS variables in quadrant analysis is not appropriate for analyzing the performance of stunting reduction programs. On the other hand, when the quadrant analysis uses the variables of change in IKPS and change in stunting prevalence, the distribution of provinces with prevalence above the national average falls into four quadrants (Table 3), and the two variables are statistically related, as discussed earlier (Table 1). Figures 4 and 5 are quadrant analyses using the Stunting Prevalence and IKPS variables. On the other hand, Figure 6 is a quadrant analysis using the IKPS change variable and the change in stunting prevalence.

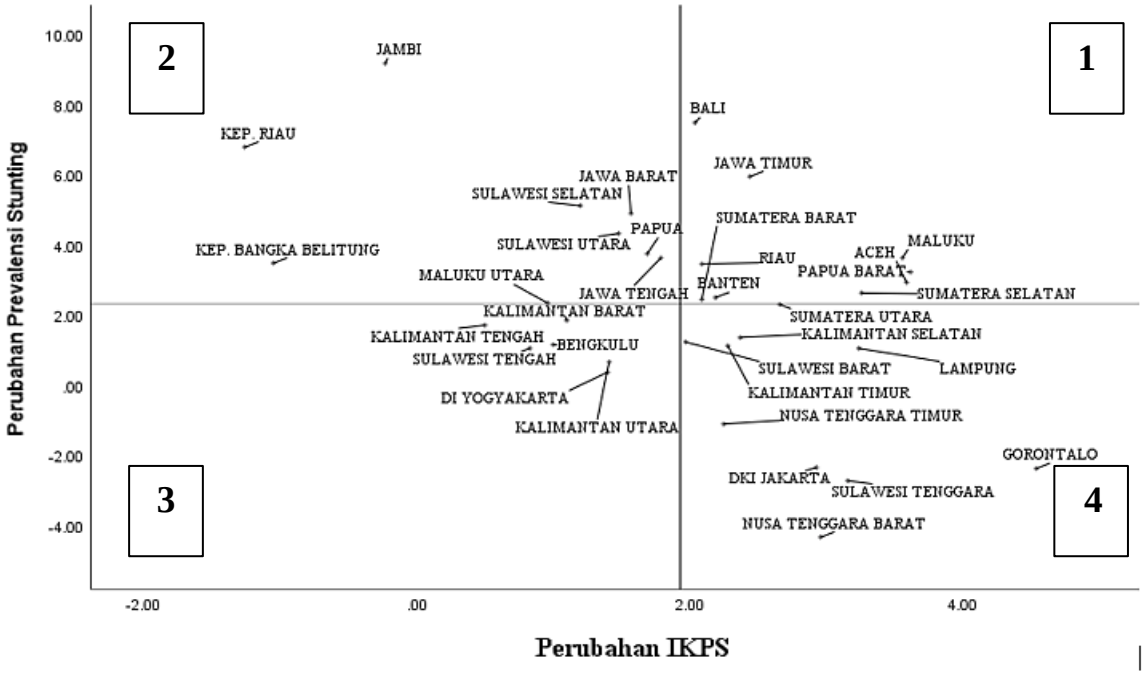

Figure 4. Distribution of 34 Provinces based on increasing IKPS scores and decreasing Stunting Prevalence in 2018 and 2019

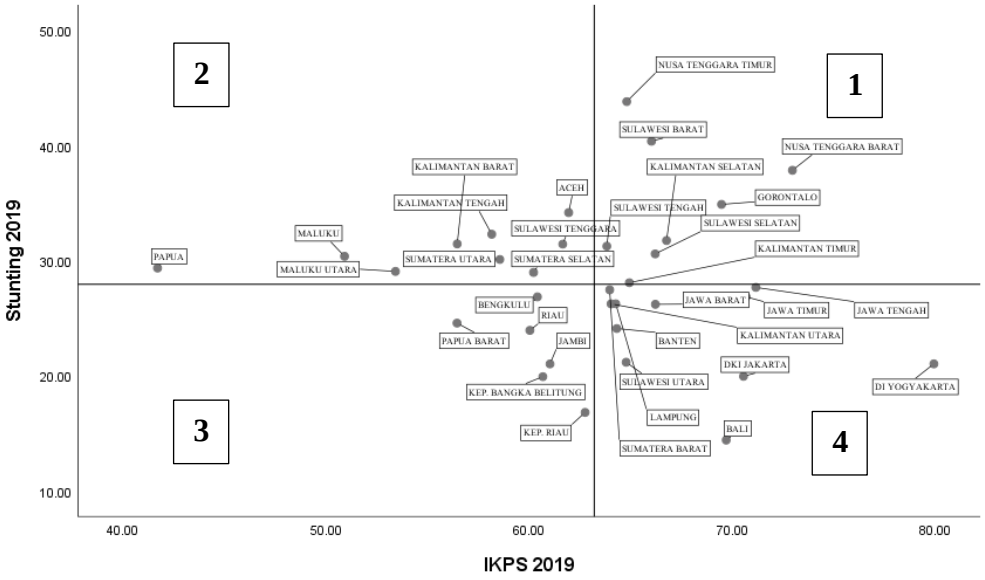

Figure 5. Distribution of 34 Provinces based on IKPS value and Stunting Prevalence in 2019

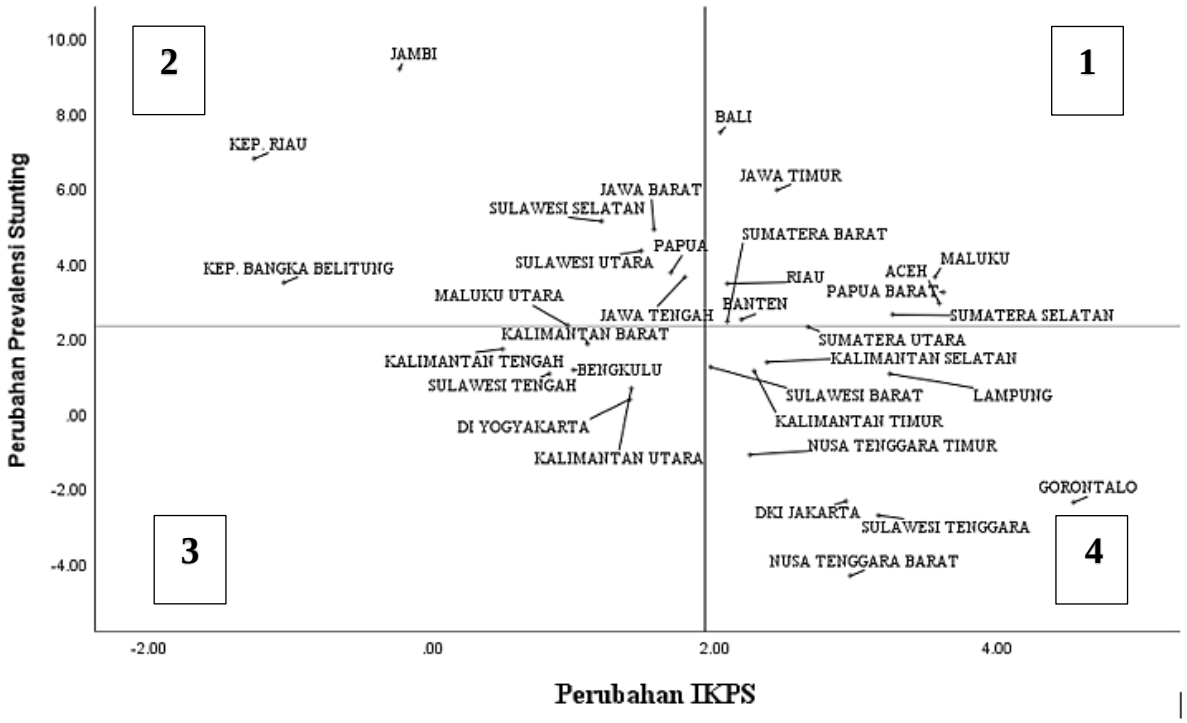

Figure 6. Distribution of 34 provinces based on the increase in IKPS score and decrease in stunting prevalence in 2018 and 2019.

DISCUSSION

The discussion is divided into three sub-sections, statistical test results, IKPS construction, and quadrant analysis.

Statistical Test

At the national level, the average increase in IKPS from 2018 to 2019 is approximately 1.93, with the highest at Gorontalo and the lowest at Riau Islands. Regarding stunting, Gorontalo has the highest increase in stunting reduction performance, but its prevalence is higher than the national average. (Table 3) Even over one year, the change in stunting prevalence is negative, meaning stunting prevalence increases. (Quadrant 4, Figure 4.) Meanwhile, Riau Islands, whose performance declined the most, fell into the category of stunting prevalence below the national average. (Table 3) even significantly decreased stunting prevalence over one year. (Quadrant 2, Figure 4) This figure aligns with the statistical tests.

The data indicate that an increase in the IKPS score is associated with a reduction in the prevalence of stunting; in other words, an increase in government performance in addressing stunting, as measured by the IKPS, actually reduces the success of the stunting prevalence reduction program. Changes in IKPS score have a 21% impact on changes in stunting prevalence, indicated by a coefficient of determination (R-square) of 0.218. In addition, the correlation test shows that there is a reasonably strong relationship between both changes in IKPS and stunting prevalence (Pearson correlation 0.467), and statistically, this relationship is very significant ($p=0.005<0.01$). (Table 1.) These findings are inconsistent with the theoretical expectations. Theoretically, IKPS dimensions such as health services, education, and household welfare significantly predict stunting reduction.[20]

The expected relationship pattern is that a low prevalence of stunting follows a high IKPS score. Conversely, a low IKPS score will be associated with a high prevalence of stunting. This pattern is found in the regression test using the stunting prevalence and IKPS variables. The regression test for these two variables shows a negative linear relationship pattern. (Figures 2 and 3) However, statistically, the correlation test between these two variables shows a fragile relationship or no correlation between IKPS and stunting prevalence, with a correlation coefficient value of 0.095 (2019) and 0.276 (2018). Statistically,

this relationship is not significant. Therefore, the IKPS variable is not a reliable indicator for predicting the prevalence of stunting.

IKPS

Stunting is a complex public health problem that requires a multi-level approach from the individual, household, and community levels.[23] The government is implementing a program to reduce stunting prevalence in 34 provinces involving various sectors, and the measure to see the government's performance has created a composite index called IKPS. Statistical test findings are inconsistent with the theoretical expectations. Theoretically, IKPS dimensions such as health services, education, and household welfare significantly predict stunting reduction.[20] These findings provide scientific evidence for re-evaluating the suitability of IKPS as an indicator of government performance in addressing stunting. The IKPS is a form of composite index (CI), which consists of individual indicators representing the dimensions that make up the concept, combined to facilitate the interpretation of a phenomenon as a whole.[24,25] The higher the IKPS, the better the government's performance in addressing stunting, which means that the program implemented impacts reducing the prevalence of stunting. However, statistical tests contradict this theory. This paper reviews the literature on the construction of composite indices. The most common issues in constructing composite indexes include indicator selection, weighting, and normalization.[24]

First, the weakness in constructing the index is the subjective selection of indicators.[24] The process can be highly subjective as there may not be one definitive indicator, there is a lack of relevant data, and there is still a debate in the literature as to which indicators cause stunting.[26] The IKPS has six dimensions: health, nutrition, food access, housing, social protection, education, and 12 indicators (Table 2).[10] In its preparation, IKPS underwent revisions by adding education variables in 2019 and again adjusting to other indicators in 2022, such as JKN (National Health Insurance) ownership and social assistance recipients.[27] The issue of stunting is inherently multi-sectoral, making the identification of relevant indicators a challenging endeavor. Indicators on nutrition and health are known, but indicators related to other sectors in the food, housing, social, and education dimensions are limited.[20] A literature review conducted by Beal and colleagues [28] may serve as a reference when considering the selection of dimensions and indicators because the study provides information on the determinants of stunting in Indonesia using the WHO conceptual framework on stunted children. In addition, based on document review [10], it was found that 13 experts from various scientific fields were involved in the preparation of the IKPS, including representatives from the Vice Presidential Secretariat, TP2AK, TNP2K, BPS, and the World Bank. However, information on the scientific background of those involved or whether the experts come from the fields of each specified dimension has yet to be available.[11] Stunting is a complex policy issue requiring collaboration among experts with high scientific, research, and policy analysis skills to make the best decisions.[29]

Secondly, the failure to select an appropriate weighting system represents a significant shortcoming. Weighting is one of the most essential steps in constructing CI. It is often the main problem in constructing CI. Weighting assesses a variable's importance and impact on the measured concept.[30] The choice of weighting method can affect the goodness of fit of a CI. Thus, incorrect weighting can hide serious failures of specific dimensions.[24] Several weighting methods include equal weighting, expert weighting, data-driven weighting, factor analysis, unobserved component models, budget allocation processes, analytic hierarchy processes, and conjoint analysis.[26,30] In the IKPS, equal weighting is used, with each dimension's weight equaling 1/6. (Table 2) Equal weighting is the most commonly utilized weighting system in constructing CI due to its simplicity. One of the most famous is the Human Development Index.[30] Research by Kusrini [17] shows a strong correlation (correlation coefficient of -0.67) between the IKPS and the Global Hunger Index Sub National (GHI-SN). The GHI-SN is a valid and reliable index for measuring hunger and malnutrition among children under five. Stunting is one of the dimensions that make up the GHI-SN, and the weight for each dimension is different (not equal).[31]

The *Weighting* comes from the theoretical contribution of the indicators to the concept. However, equal weighting may be applied if no opposing theoretical perspective

exists.[30] Equal weighting means that interventions in each dimension play an equally significant role in reducing the prevalence of stunting.[32] On the other hand, some studies have found that the contribution of determinants of stunting varies.[20,33,34] Additionally, there is significant variation in the contribution of determinant factors across regions.[35]

Several studies have found that health services, household welfare, and parental education are important determinants of stunting reduction in many countries. They account for about half of the reduction in stunting prevalence. However, the magnitude of each determinant's contribution varies across countries; in some countries, health services are the primary driver; in others, it is household welfare and parental education.[20] Bhutta [33], in a study, shows the varying degrees of program impact on stunting reduction: 40 percent from direct and indirect strategies in the health sector, 50 percent from other sectors, and 10 percent from other determinants. Even within a single dimension, the difference in magnitude of the contribution between the indicators can be significant; for example, the study of Rizal and van Doorslaer [9] shows that the contribution of the health workers' factor has the most significant contribution compared to the immunization factor. Determining which interventions to prioritize is challenging. One challenge is that policymakers are uncertain about which interventions are effective, which may impede progress in reducing stunting.[20] Therefore, the choice of weighting method is crucial and should be carefully considered in constructing and evaluating an index, as the weighting of dimensions will significantly impact the overall index.[26,36] For example, the ranking of a country or region can be manipulated upwards due to errors in the weighting method, commonly known as the index problem.[32]

Third, the normalization method also affects the CI's goodness of fit.[24] Normalization aims to make the indicators comparable because different indicators usually have different units and are defined on different scales.[30,37] Some normalization methods are standardization (z-score), min-max (rescaling), and distance from reference (indicization). The IKPS uses the min-max normalization (rescaling) (Table 2). This method is the most widely used because of its ease of use and ability to measure performance based on best and worst.[37] For comparison, the Global Hunger Index [38] at the subnational level (GHI-SN), which has stunting as one of its dimensions, uses standardization method of normalization. Different methods will produce different CIs, so a robust analysis is necessary to assess the impact of the results.[30]

An index has to be simple so that it is easy to understand and analyze, but constructing an index takes work.[30,37] It requires several decisions, from determining variables and indicators to aggregation methods, normalization and weighting, and data availability. The IKPS can produce rational and functional policies if well constructed.[39] Conversely, if the IKPS is not robust, then the policy message will be mistaken or misinterpreted [25], as is the case with the findings of this study.

Quadrant Analysis

Quadrant 1 is provinces where stunting prevalence has declined while IKPS has risen above the national average change. This quadrant is referred to as the "keep up the good work" quadrant, indicating that IKPS is an essential attribute in reducing stunting prevalence; Quadrant 2 is provinces that experience a reduction in stunting prevalence above the average, with IKPS scores below the average. This quadrant is a "low priority" area, which means that the provinces in this quadrant are not the program's focus. A study conducted by Hossain [40] states that a program is effective if it can reduce the prevalence of stunting by at least 3% per year. Thus, quadrants 1 and 2 are included in the category of provinces with successful programs because as many as 13 out of 18 provinces (70%) in these two quadrants have experienced a more than 3% reduction in prevalence in one year. These provinces are listed as follows: Jambi, Bali, Kep. Riau, East Java, South Sulawesi, West Java, North Sulawesi, Papua, Maluku, Central Java, Kep. Bangka Belitung, Riau and West Papua (Figure 4.).

Quadrant 3 are provinces that experience a decline in stunting prevalence and an increase in IKPS compared to the national average. This quadrant is a "high priority" quadrant, where provinces in this quadrant are the program's focus. Meanwhile, Quadrant 4 consists of provinces that have decreased stunting prevalence below average and have increased

IKPS above average. This quadrant is a "monitoring area". In this quadrant, some provinces show a slight decrease in stunting prevalence. 50% of the provinces show increased stunting prevalence, while the IKPS score significantly increases. This condition indicates that the stunting reduction program has failed. Furthermore, there are ten provinces in this quadrant, 8 of which have prevalence rates above the national average, while the other 2 have low prevalence rates. These two provinces are DKI Jakarta and Lampung (Figure 4).

The quadrant results were not analyzed in depth because statistical tests showed a pattern of relationships that was inversely proportional to existing theory. However, this study shows that using IKPS in quadrant analysis can provide policy communication messages, which will differ depending on the use of variables. For example, using IKPS change and stunting prevalence change variables, DKI Jakarta and Lampung provinces in quadrant 4 (Figure 4) convey that the stunting program failed in these two provinces. However, when using IKPS and stunting prevalence variables, these two provinces are ranked among the top 5 provinces (Table 3) for stunting reduction program success, characterized by high IKPS and low stunting prevalence.

In summary, the IKPS can be a handy tool for measuring, monitoring, and evaluating stunting reduction programs at the national level and identifying the sequence of achievements between provinces if the construction of the IKPS is reviewed and evaluated for accuracy.[24–26,37] This study suggests revisiting the IKPS methodology regarding indicator selection, weighting, and normalization methods. It is also worth noting that this study provides scientific evidence for using change variables. That quadrant analysis using the variable change in stunting prevalence at a particular measurement time and the value of changes in IKPS can show the government's performance in handling stunting. Quadrant analysis can be a tool for the government to make policy, and this can also fulfill the critical agenda of the Nutrition for Growth (N4G) Summit in 2021, where Indonesia also committed to developing tools to support program planning and decision-making.[20,41,42]

CONCLUSION

This study shows that the IKPS variable has no relationship with stunting prevalence and that IKPS cannot be the predictor of stunting prevalence. However, if the analysis uses the variables changes in IKPS and changes in stunting prevalence, the study results show a relatively strong and significant relationship so that the regression model can predict changes in stunting prevalence. However, the relationship between these two variables is negative, which means that an increase in IKPS will reduce the success of the reduction in stunting prevalence. These findings directly contradict the theory and objectives of the IKPS itself. This study outlines several possible flaws in the construction of the IKPS. Therefore, researchers recommend a study using a robust theoretical framework to construct the IKPS to produce a reliable index for measuring government performance in dealing with stunting. In particular, selecting the indicators, it is essential to consider which indicators directly affect the occurrence of stunting. Furthermore, in selecting the weighting method, researchers recommend carrying out quantitative research to assess the contribution of each dimension and indicator in reducing the prevalence of stunting in Indonesia.

Apart from this, a quadrant analysis was also carried out in this study to see the success of the stunting reduction program. Quadrant analysis categorizes provinces into provinces with program success in quadrants 1 and 2 and provinces with program failure in quadrants 3 and 4. Regarding program priorities, quadrant 2 is a low-priority area, while quadrant 3 is a high-priority area. Quadrant 1 is an area of good performance and needs to be maintained, while quadrant 4 is an area of program failure and requires evaluation. The quadrant analysis demonstrates the importance of reliable IKPS scores in producing a tool that will assist the government in planning and evaluating programs and formulating policies to address stunting in Indonesia.

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