
Revenue and Expenditure Budgets and Village Development Index to Reduce Stunting: A Case Study from Indonesian Provinces

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Abstract

Stunting is a public health concern affecting several countries worldwide, including Indonesia. Previous studies have shown that stunting is more prevalent in rural areas than in urban ones. The objectives of this study is to examine the effects of village expenditures on development implementation, community development, and community empowerment, as well as the Village Development Index, across 33 Indonesian provinces. Secondary data was collected by the Central Statistics Agency in 2016, 2019, and 2021. The study was designed using quantitative research and panel data regression. The analysis results using the fixed effect model with one tail hypothesis test indicated that: first, village spending on development implementation has had no significant effect; second, village expenditure on development has no discernible effect; third, village expenditures on empowerment had no discernible effect; fourth, stunting rates in Indonesian provinces are significantly affected by Building Village Indexes.

Keywords: stunting, village budget, village building index

1. Introduction

Stunting is a chronic nutritional issue in toddlers characterized by a shorter height than some other children their age (Ministry of Health, 2018) (Nisa, 2018). The World Health Organization (2006) defines stunting as a height index compared to age with a limit (z-score) of less than-2 Standard Deviation. Stunting is a global health issue that affects many countries throughout the world (de Onis & Branca, 2016). This is because stunting is closely associated to long-term risk. Stunting limits the potential and development of human resources as it has a long-term impact on their cognitive function and productivity as adults (Prendergast & Humphrey, 2014). Eventually, stunting can stifle economic progress and potentially increase poverty rates (Bhagwati & Panagariya, 2013; Roberts, 2012).

Indonesia is one of the countries where stunting persists. UNICEF (2018) ranked Indonesia sixth in terms of stunting prevalence (Utami et al., 2019). In 2019, almost 8 million children under the age of five (or 27.7 percent) had stunting, more than any Southeast Asian country and equivalent to poor Sub-Saharan African countries like as Mali, Ethiopia, and Djibouti (Soekatri et al., 2020). According to the most recent Ministry of Health data, Indonesia has a stunting rate of 24.4 percent (Azizah & Permatasari, 2020; Soekatri et al., 2020). This number exceeds the WHO's target of 20% by 2022.



Source: Indonesian Ministry of Health (Khairani, 2020)

Figure 1. Stunting in Indonesia

Several studies addressed stunting instances in Indonesia and other developing countries, on children under the age of five, which is relatively high in rural areas (Cordeiro et al., 2021; Indriastuty & Kusnadi, 2019; Sserwanja et al., 2021). These findings are consistent with basic health research findings, which show that the prevalence of stunting in children under the age of five in Indonesia is 34.9% in rural areas and 27.3% in urban areas (Ministry of Health, 2018). The high risk of stunting in rural areas may be due to a lack of access to food and health services, as well as maternal knowledge (Cordeiro et al., 2021; Sserwanja et al., 2021). This is comparable to the WHO model, which claims that community and socioeconomic factors influence stunting. Among other influencing factors to stunting are politics and economics, health, health facilities, education, society and culture, food and agriculture systems, water, sanitation, and the environment (Stewart et al., 2013; WHO, 2014).

Stunting prevention is a national, city/district, and village development priority. The Villages Law No. 6 of 2014 grants the village government the authority to administer government matters and manage its territory based on origin rights and village-scale authority. Spending on stunting more than doubled after the 2014 Village Law was passed (Dirkareshza & Sihombing, 2021; Rossevelt, 2022). Preliminary comparisons of the 2016 village budget and 2019 village expenditures reveal that villages have increased their investment in stunting-related sectors (Indra & Khoirunurrofik, 2022).

Village-scale municipal governments are undertaking preventative measures (Indra & Khoirunurrofik, 2022). According to the Village Law, village authority in the APBDes (Village Revenue and Expenditure Budget) comprises the fields of village administration, village development implementation, community development, community empowerment, and unanticipated expenditures. Village governments often implement development, coaching, and empowerment programs to reduce stunting. The expenditures implementation of *pembangunan desa* (BANGDES) 'village development' comprises expenditures on the sub-sectors of education, health, and residential areas. Infrastructure such as *poskesdes* (Village Health Post), *polindes* (Village Maternity Home), *posyandu* (Integrated Healthcare Center), PAUD, sanitation,

and clean water are included in the budget. Additionally, spending in multiple fields at the village level while simultaneously time can reduce stunting rates in 9 African countries (Mitchell et al., 2018; Pronyk, 2012). Agriculture, the environment, business growth, education, infrastructure, and health are some of the investment areas.

Village administration can strengthen the capacity of community institutional cadres in the area of *pembina and kemasyarakatan* 'community development' (BINDES). Cadre training potentially can increase knowledge, awareness, and role in stunting prevention (Hadi et al., 2021; Martha et al., 2020; Nugraheni et al., 2020; Sompa, 2021). Continuous training and awards are required to improve the role and function of stunting prevention cadres (Mediani et al., 2022). These activities can be funded through community development spending.

In the area of *pemberdayaan desa* (DAYADES) 'community empowerment' the village administration can conduct programs to empower women, health cadres and *posyandu*, agriculture, and business. Village empowerment in agriculture, education, gender, health, and economics has been demonstrated to lower stunting prevalence (Mitchell et al., 2018; Remans et al., 2011). Education and training can also help to minimize stunting by empowering women and health professionals (Handayani et al., 2020).

Stunting prevention is closely linked to development. A study in India found that stunting rates were highest in poor areas (Singh et al., 2019). Consequently, stunting prevention through local governments is required to assess the level of local government support, one of which is the *Indeks Desa Membangun* 'Village Development Index' (DVI/IDM). IDM refers to Permendes No. 2 of 2016 is an index that measures the level of village development and community empowerment in various fields. The area of village development is divided into two categories in IDM: The Social Dimension is broken down into four sub-dimensions: health, education, social capital, and settlements. The economic factor consists of the diversity of output in rural settlements, the availability of trade service centers, access to logistics distribution, access to banking and credit institutions, economic institutions, and regional openness. The Ecological Dimension includes environmental quality as well as the prospective of natural disasters. The IDM number is determined by dividing the three indices by their average. Furthermore, based on IDM data, villages are divided into five categories: highly underdeveloped, underdeveloped, developing, advanced, and autonomous (Rahmah, 2020; Sunaryono, 2021).

The Millennium Villages Project (MVP) has already pioneered the concept of community development in stunting reduction. Therefore, village development as part of the MVP program has lowered stunting rates (Mitchell et al., 2018; Pronyk, 2012; Remans et al., 2011). Similarly, the IDM's evaluation of village development can be used to anticipate a village's participation in stunting prevention.

The objective of this study is to evaluate the effect of village spending on the implementation of village development, community development, and community empowerment, as well as the Village Building Index, on the prevalence of stunting at the provincial level in Indonesia. Figure 1 shows the four hypotheses to be examined:

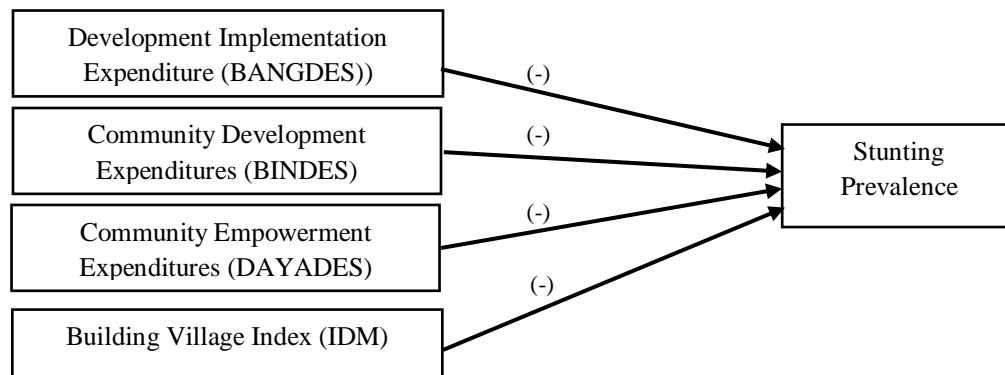


Figure 2: Conceptual Framework of the Study

The hypotheses in this study were based on the conceptual framework in Figure 1:

- H1: BANGDES has negative and significant effect on stunting
- H2: BINDES has negative and significant effect on stunting
- H3: DAYADES has negative and significant effect on stunting
- H4: IDM has negative and significant effect on stunting

2. Method

2.1 Research Scope

The study used quantitative methods to determine the village's role in development implementation, community development, and community empowerment, as well as the Village Building Index on the stunting prevalence at the provincial level in Indonesia. The unit of analysis in this study is 33 provinces with village areas.

2.2 Data Types and Sources

Panel data with secondary data types was used in 2016, 2019, and 2021. Panel data is a combination of time series data and cross section data (individual). While secondary data is gathered data and retrieved as a result of third-party processing or from other available sources (Bryman & Cramer, 2002). The data used in this study derived from the Central Statistics Agency's Village Budget Realization Report, the Ministry of Villages' Village Development Index, and the Ministry of Health's stunting prevalence at the provincial level in 2016, 2019, and 2021. Variables and their measures in the study include, among other aspects:

Table 1. Measurement of Research Variables

Variables	Data sources	Unit	Symbol
Dependent variable			
1. Stunting Prevalence	Ministry of Health	Percent	STUNTING
Independent variable			
1. Development Implementation Expenditures Per Capita	Central Bureau of Statistics	Rupiah	LN BANGDES
2. Expenditures on Community Development Per capita	Central Bureau of Statistics	Rupiah	LN BINDES
3. Expenditures on Community Empowerment Per capita	Central Bureau of Statistics	Rupiah	LNDAYADES
4. Village Development Index	Village Ministry	Percent	IDM

1.3 Data Analysis Techniques

Panel regression was used to test the hypothesis in this study. On panel data, panel data regression analysis was used to examine the relationship between one dependent variable and one or more independent variables (Jaya & Sunengsih, 2009). A regression model used mathematical relationships to predict output values based on input values. The F test, coefficient of determination, and t test with one tail hypothesis testing were used. The following models were used in this study:

$$\text{Stunting}_{it} = \alpha + \beta_1 \text{LN Bangdes}_{1it} + \beta_2 \text{LN BindeS}_{2it} + \beta_3 \text{LN Dayades}_{it} + \beta_4 \text{IDM}_{it} + e$$

Information:

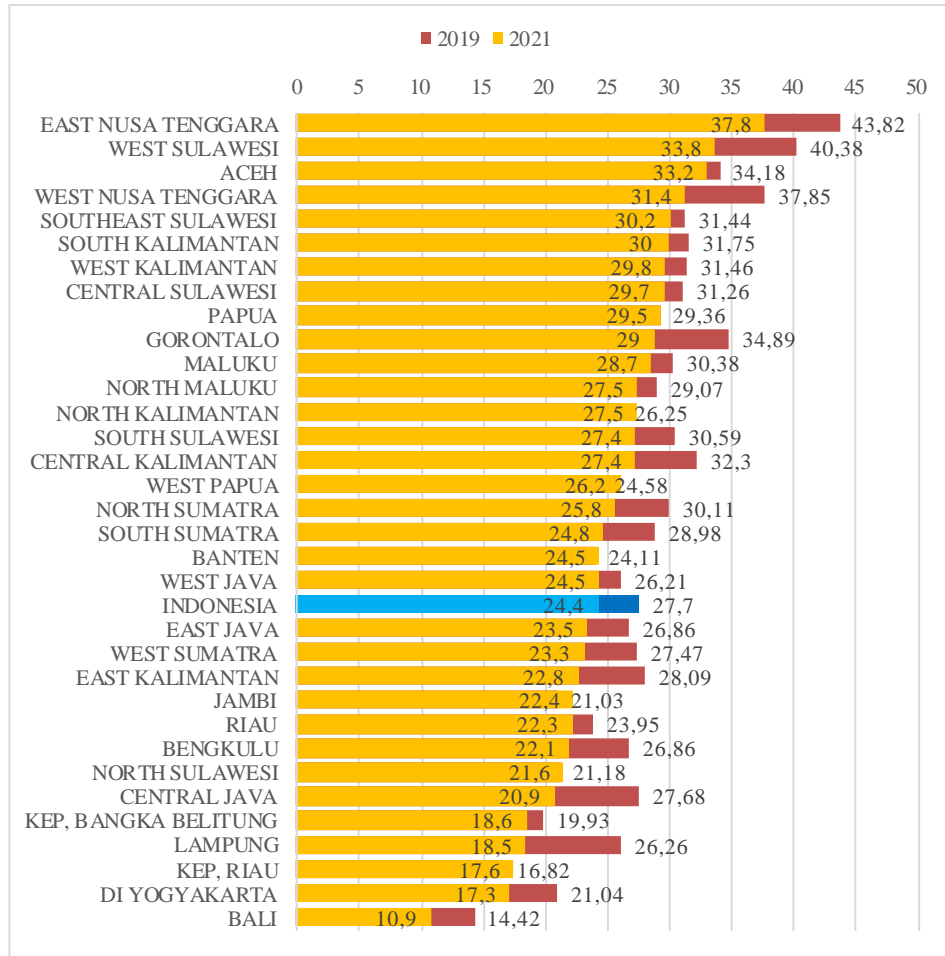
- Stunting_{it} = Stunting prevalence in province i year t
- Bangdes_{it} = Village expenditure development per capita in province i year t
- BindeS_{it} = Village expenditure per capita in the development field in province i year t
- Dayades_{it} = Village expenditure per capita in the empowerment field in province i year t
- IDM_{it} = Village Building Index Province i year t
- α = Constant
- LN = Natural Logarithm
- β₁ – β₄ = Regression coefficient
- e = Error term

The Common Effect Model, Fixed Effect Model, and Random Effect Model are three regularly used approaches for estimating the regression model with panel data (Widarjono, 2009). For this reason, it is necessary to test to select the most relevant model. The selection of the best model is done through the Likelihood Ratio test by Chow(Ou et al., 2017), the Lagrange Multiplier test by Breusch Pagan and Hausman (Breusch & Pagan, 1980). The model is then subjected to statistical tests such as the F, T, and R² tests.

3. Results

3.1 Stunting Prevalence in Indonesia

The graph below shows the prevalence of stunting at the provincial level in Indonesia:Source:



Kemenkes (Ministry of Health), Processed.

Figure 3: Stunting Prevalence at the Provincial Level in Indonesia

Based on Figure 3, most stunting rates at the provincial level in Indonesia were expected to decline in 2021 compared to 2019. However, the majority of Indonesian provinces are still above the WHO target of 20%. This figure shows that, despite its success in reducing stunting, Indonesia still needs to focus on the issue.

Provinces in eastern and central Indonesia, including the Nusa Tenggara Islands, Sulawesi, Kalimantan, and Papua, have the highest stunting rates. Despite the fact that Aceh, a province in western Indonesia, ranks third. Meanwhile, most provinces in Java, Sumatra, and Bali are mostly below the Indonesian national average.

This shows that stunting rates are higher in central and western Indonesia than in western Indonesia. Another pattern that can be discovered is that provinces located at the farthest reaches of Indonesia's land have a higher prevalence. Aceh, Papua, and East Nusa Tenggara provinces are among them. This implies that the stunting rate in Indonesia is higher in the country's outskirts.

3.2 Regression Model Selection

Test is necessary to determine the best model. The tests carried out include: (i) Chow Test, Hausman Test and Lagrange Multiplier Test. In the Chow test if the probability is > 5% then CEM is better than FEM. In the Hausman test, if the probability is > 5%, the REM model is better than FEM. Meanwhile, in the Lagrange multiplier test, CEM is better than REM if the probability is > 5%. The test results are displayed as follows.

Table 2. Best Model Test Results

Statistical Test	Probability	Best Model
Chow	0.0000	FEM
Hausman	0.0418	FEM

Source: Data Processing Results

The chosen model is fixed effect, according to the test results table above (FEM). This approach implies that the *intercept* for each subject (cross section) is different, but that the *slope* of each subject does not change over time (Gujarati, 2012). In other words, individuals are believed to have distinct habits that do not change over time.

3.3 Regression Test Results

The prevalence of stunting in Indonesian provinces is examined using panel regression to determine the impact of village expenditure variables in the field (LNBangdes), training field (LNBindes), and empowerment field (LNDayades) and the Village Development Index (IDM). Using the test as a basis, the fixed effect model was chosen as the regression model (FEM). Following is a list of the chosen regression models.

Table 3. Regression Test Results

Independent Variable	Expected results	Coefficient	t-statistics	t-table	Conclusion
LNBangdes	(-)	1.469	1.0323	-1,6605	H ₁ Rejected
LNBindes	(-)	2.314	1.4935	-1,6605	H ₂ Rejected
LNDayades	(-)	-0.859	-0.7098	-1,6605	H ₃ Rejected
IDM	(-)	- 29.715	-3.5791	-1,6605	H ₄ Accepted
R ²	=	0.8828			
F-Statistics	=	12.9825			

Source: data processing results.

Based on the one tail hypothesis test, the results obtained include: Development expenditure has no significant effect on the prevalence of stunting with a coefficient of 1.469 and probability $0.3059 \geq \alpha$. This means that every one percent increase in village spending on development will increase the stunting prevalence by 1,469 units. The t-statistical value of $1.4935 > -1.6605$ indicates that the Bangdes variable has no statistically significant effect on the stunting prevalence. Therefore, hypothesis 1 was not proven.

Expenditure in the development field has no significant effect on the prevalence of stunting with a coefficient of 2.3135. This suggests that every one percent increase in the village community development expenditure variable, the stunting prevalence increases by 2.3135 units. The statistical t value shows $2.1744 > -1.6605$, meaning that the Bindes variable has no statistically significant effect on stunting. Therefore, hypothesis 2 was not proven.

Based on the regression results, empowerment expenditure has no significant effect on the stunting prevalence with a coefficient of -0.8594. This suggests that for every 1 percent increase in spending on rural community empowerment, the stunting prevalence was reduced by 0.8594 units. The t-statistic value of $-0.7098 > -1.6605$ suggests that the Dayades variable has no statistically significant influence. Therefore, hypothesis 3 was not proven.

The Building Village Index showed a negative and significant effect on the stunting prevalence with a coefficient of -29,71470. This suggests that every unit increase in the Building Village Index reduces the stunting prevalence by 29.7147 units. IDM had a statistically significant influence on stunting, as evidenced by the t-statistic value of $-3.5791 < -1.6605$. Therefore, hypothesis 4 was proven.

The F-statistic value of $12.9825 > 2.4685$ indicated that the Bangdes, Bindes, Dayades, and IDM factors have a substantial effect on stunting. While the coefficient of determination R2 was 0.8828, this means that the factors in the model may show 88.28% of the variations in the stunting variable, while the remaining 11.72% were influenced by variables outside of the model.

The following are the results of hypothesis testing in this study:

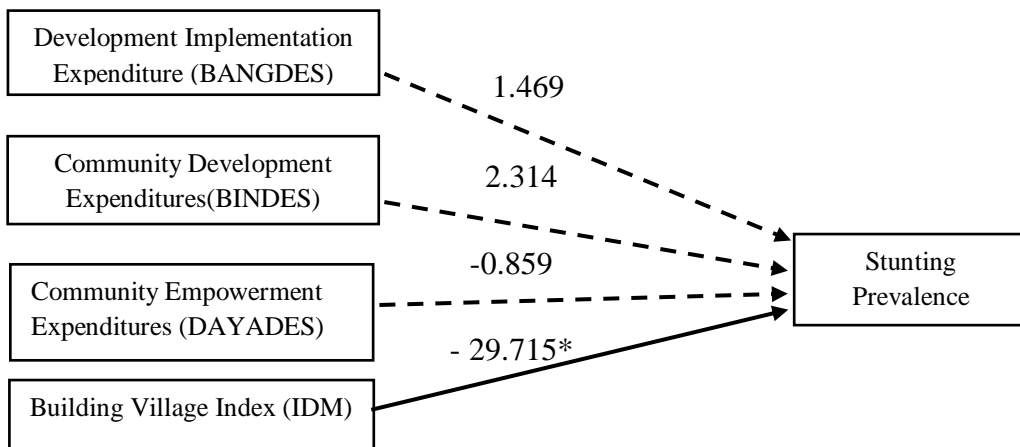


Figure 4: Summary of the Hypothesis Test Results

Information:

* statistically significant

—————▶ accepted hypothesis

-----▶ rejected hypothesis

4. Discussion

4.1 Effect of Bangdes on Stunting

According to the regression test, the influence of this variable is not significant. This study contrasts with several studies (Mitchell et al., 2018; Pronyk, 2012), who showed that rural development in several fields through the Millennium Village Project (MVP) program can reduce stunting rates in African rural areas. This is because village government development expenditure does not exclusively focus on stunting prevention. Village investment in the development sector is generally focused on the provision of physical facilities and infrastructure, while it does not rule out the potential of supporting basic service operations. Meanwhile, MVP development comprises training and empowerment programs, as well as rural business development.

This perspective is substantiated in some studies (Greg et al., 2010; Ndabeni et al., 2016), who showed that government development investment has a limited influence on cases of malnourished children in India, implying that a Local Economic Development (LED) approach is necessary. This indicates that development expenditures must be complemented by empowerment in handling stunting cases.

Thus, physical development cannot have a direct effect on stunting prevention. Nonetheless, development should be implemented consistently. This is because scientific evidence shows that physical development involves the provision of basic health and education services, as well as infrastructure, which has a significant impact on stunting rates in rural areas. Therefore, in order to accelerate stunting prevention, development implementation spending, particularly for the provision of basic services, should be promoted.

4.2 Effect of Bindes on Stunting

The regression test results show that this variable has no significant effect. This result is in contrast the expected theory. This is because the components of expenditure on village community development related to stunting are exclusively in the sub-sector of social institutions.

The village administration, for example, can carry out development and mentoring programs for institutions such as the PKK so that they can participate more effectively to stunting prevention. This is confirmed by several studies (Martha et al., 2020; Nugraheni et al., 2020), who indicate that training for cadres and mothers improves cadres' knowledge, awareness, and abilities to prevent stunting. Furthermore, Darmiyanti's (2019) study showed a good and significant association between PKK awareness and its impact in stunting reduction. As a result, socialization and mentoring for cadres, particularly the PKK, are essential in order to enhance

their role in stunting prevention, which can be funded by the APBDes in the field of community development.

Based on these findings, it is possible to argued that training cadres of community institutions in the expenditure of the sub-sector of social institutions can indirectly reduce the stunting rate. However, because the proportion of the sub-sector of social institutions is relatively small in terms of expenditure on the development sector and its indirect effect on mothers and children, this variable cannot explain its effect on stunting in the expected direction of the theory. Nonetheless, local expenditures can continue to increase the capacity building of cadres of community institutions. Therefore, cadres with a stronger role and dedication to preventing stunting are likely to emerge.

4.3 The Effect of Dayades on Stunting

The regression test results show that empowerment expenditure has no statistically significant effect. The village administration might allocate funds for various stunting-related programs when spending on community empowerment. Women's empowerment, agricultural empowerment in general, *posyandu* cadre empowerment, and business empowerment through cooperatives, UMKM / MSMEs (Micro Small and Medium Enterprises), and investment are among them. It is intended that this empowerment will increase rural communities' ability to meet food demands in terms of education and nutrition knowledge, child care, and economic capacity.

Several studies have found that investment in empowerment helps reduce stunting in rural areas. Handayani et al., (2020) found that the provision of training and the village's participation in providing facilities and supervision of *posyandu* cadres influence the competence of *posyandu* cadres. The results of study by Remans et al., (2011) indicate that interventions in agriculture, empowerment based on community and gender education, and empowerment in the health sector can lower stunting rates. Mitchell et al., (2018)'s study also showed that villages intervened with empowerment programs such as agriculture, education, and business development had lower stunting rates than surrounding villages.

Based on this explanation, empowerment activities should continue. The village administration might provide support through health cadres who directly disseminate nutrition and health knowledge to mothers in rural areas. Additionally, economic empowerment is required to increase the empowerment of rural populations, particularly mothers. So that this activity can strengthen the knowledge and skill for mothers, particularly those with toddlers, in caring for and fulfilling nutrition. Thus, it has the potential to alleviate stunting in children over time.

4.4 Effect of IDM on Stunting

Based on the regression test results, IDM had a negative and significant effect. This result is in line with the expected theory that development in various fields can enhance people's living standards, one of which is children's nutritional quality, as measured by the stunting prevalence. The study results confirmed in studies (Mitchell et al., 2018; Remans et al., 2011), who found that interventions and development in agriculture and the environment, business development,

education, infrastructure, and health have the ability to eliminate child stunting. This additionally confirmed by Pronyk's(2012)study which shows that increasing per capita spending on interventions in various development sectors can reduce stunting rates.

This study is in line with the IDM's concept of village development in Indonesia. Improving infrastructure availability, basic services, the environment, the economy, and business can all enhance people's lives, including reducing stunting. Thus, Indonesia's rural development must be addressed. Aside from initiatives to equalize physical development, village development is also required to empower rural populations.

5. Conclusion

This study discovered that village spending in each of its respective areas of authority seems to have no effect on stunting prevention. Sustained and concurrent expenditure in several areas of sustainable development is essential. This is shown by the significant influence of the Village Building Index as a measure of village development on the stunting prevalence. Meanwhile, expenditure on each area of village authority related to stunting is not in line with the expected theory. Stunting control must be done massively, sustainably, and with the cooperation of all parties. Government policies that are mutually supportive and sustainable are necessitated at all levels in government, from the national level to the village level. Then, community support, academics, and health workers are necessary, because stunting prevention can directly target the community, particularly rural areas. This study is still limited to the provincial level and village authority expenditures, but the data can be used as a basis for a more comprehensive analysis of stunting rates across Indonesia.

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