Typology Analysis and Relationship Between Stunting Prevalence, Economic Growth and GRDP Per Capita in Province of Bali

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ABSTRACT

Keywords:
Stunting Precalance, Economic Growth, GRDP

This study aims to determine the dynamics of the growth pattern and structure of each city/regency in the Province of Bali and try to see its relationship with the stunting prevalence in the Province of Bali. The analytical method used in this research is the Klassen Typology analysis technique and the Spearman Rank Correlation. The results of the Klassen Typology analysis, when correlated with stunting data, show that the Buleleng area which is a developed area (quadrant 1) has a high stunting prevalence of 10.30%, while Tabanan is a relatively underdeveloped area (quadrant 4) has a stunting prevalence below the average Province of Bali (6.6%). The results of the correlation test with the Spearman Test showed that there was no significant relationship between economic growth and GDP per capita partially on the stunting prevalence in Province of Bali, but each of the two variables had a negative relationship. Thus, further research is needed regarding other facts regarding the stunting prevalence in the Province of Bali, so that it can provide a clear picture of the variables that influence the stunting prevalence in each district/city.

1. INTRODUCTION

One Indonesia will experience a golden age in 2045, in other words Indonesia will be 100 years old. At that time, Indonesia was targeted to become a developed country and be able to be on par with other developed countries. That momentum is still twenty-five years away, it looks like it's still quite a long time away, but what needs to be realized is that to realize Indonesia's target of golden age in 2045, which is a big dream, requires thorough preparation and is not an easy thing, because stunting is still one of the a major nutritional problem for infants and children aged 5 years and under.

Stunting cases occurred in 160 million children under the age of 5 worldwide in 2013, and most of them were found in countries with lower middle income [1]. Stunting in Indonesia is a very worrying problem because it affects 30.8% of children under the age of five - almost eight million children in 2018. The government has designed several interventions to reduce stunting, which consist of programs implemented by central and regional governments [2]. The problem of stunting is the main focus of the President of the Republic of Indonesia, because even though the stunting prevalence is decreasing every year, it is still considered high when compared to other developed countries. The President's directives regarding the reduction of stunting have been contained in Presidential Regulation Number 72 of 2021 concerning accelerating the reduction of stunting. There are various factors that cause toddlers to suffer from stunting, based on research results, the determinants of stunting are male gender, premature birth, short birth length, non-exclusive breastfeeding for the first 6 months, mother's height, low mother's education level, low socioeconomic status of the household, living in a household with inadequate and poorly maintained latrines, poor access to clean water, poor access to health, and living in rural areas [3].

Another study related to stunting was conducted regarding the factors that influence the incidence of stunting using an inferential analysis model and found that the most consistent factors associated with childhood stunting are: mothers who have low education level, increasing age of children, male sex, poor households, long duration of breastfeeding , low birth weight, mother's age (<20 years), source of drinking water (not improving), mother with low body mass index (BMI) (<18.5), diarrhea, low father's education and place of residence (rural) [4].

Stunting has both short term and long-term impacts. In the short term stunting will have an impact on children's physical growth, namely the average height of children below the average height of children of their age, besides that children who suffer from stunting will have cognitive development disrupted or their cognitive development will slow down due to disrupted brain development so that it can reduce children's intelligence. Meanwhile, in the long term, stunting will make children more vulnerable to contracting diseases such as diabetes, obesity, heart disease, blood vessels, cancer, stroke, and disability in old age. In addition, the long-term impact on children who suffer from stunting is related to the quality of a country's human resources, where the physical and mental development that is not optimal caused by stunting can reduce productivity in adulthood. Therefore, if stunting is not addressed immediately, this will certainly lead to a decline in the quality of human resources in
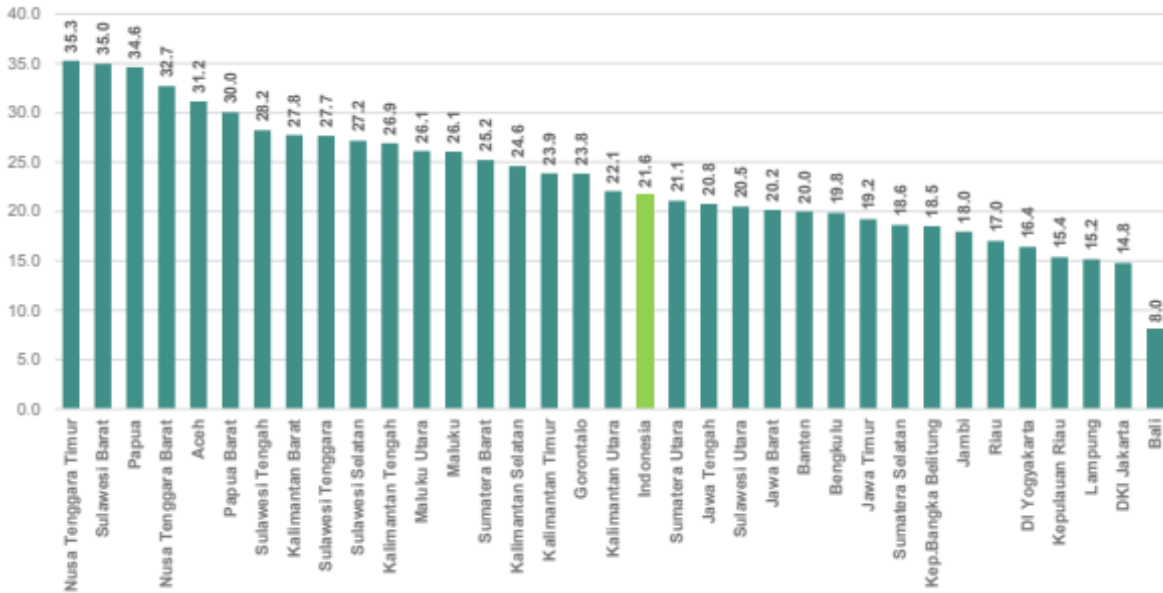
Fig. 1. Stunting Prevalence Under Five by Province in Indonesia in 2022 (Badan Pusat Statistik, 2023)

with the future because the future of the Indonesian nation is very dependent on children as the nation's next generation.

The condition of the stunting prevalence under five in Indonesia has decreased from year to year. Figure 1 below shows the percentage of the stunting prevalence in all provinces in Indonesia.

In Figure 1 it can be seen that Province of Bali is the province with the lowest stunting prevalence rate in Indonesia in 2022, followed by DKI Jakarta which is the province with the second lowest stunting rate and has only managed to record a stunting prevalence of 14.8%, followed by Lampung with 15.2%, Riau Archipelago by 15.4%, and DI Yogyakarta by 16.4%. Meanwhile, the five provinces with the highest stunting prevalence were East Nusa Tenggara with 35.3%, West Sulawesi with 35.0%, Papua with 34.6%, West Nusa Tenggara with 32.7%, and Aceh with 31.2%. In 2021 Bali has reached 10.9% which exceeds the national target of 14%. In 2022, efforts to reduce stunting will also continue to be carried out until it has fallen to 8.0 percent [5]. Even though Bali has

succeeded in reducing its stunting prevalence by 2.9 percent in 2022, there are still quite significant differences between one region and another. Two other districts that are still high, namely Jembrana and Buleleng.

Based on the picture above, it can be seen that there are five districts/cities in Bali that have a stunting prevalence above the average for the Province of Bali, namely Jembrana (14.2%), Buleleng (11.0%), Karangasem (9.2%), Bangli (9.1%), and Tabanan (8.2%). Meanwhile, four other region had a stunting prevalence below the average for Province of Bali, namely Klungkung with 7.7%, Badung with 6.6%, Gianyar with 6.3%, and Denpasar City with 5.5%.

Figure 3 shows that in general seven region in Province of Bali have experienced a decrease in the stunting prevalence, but Buleleng and Gianyar have experienced an increase in the stunting prevalence.

Buleleng is up by 2.1% from 2021, and Gianyar is up by 1.2% from 5.1% in 2022. The quality of human resources in the future is closely related to the problem of stunting. The gap that widens

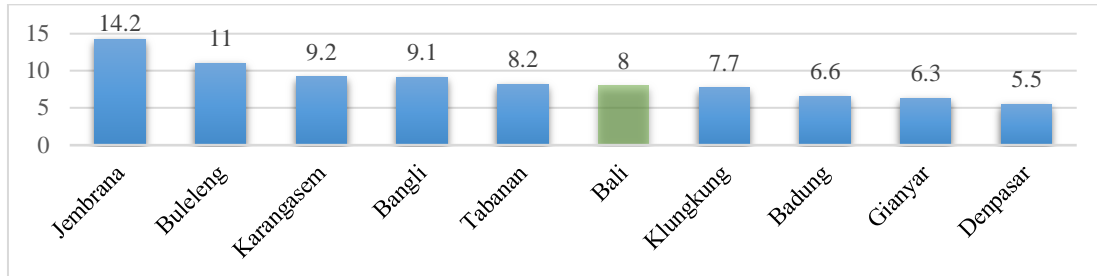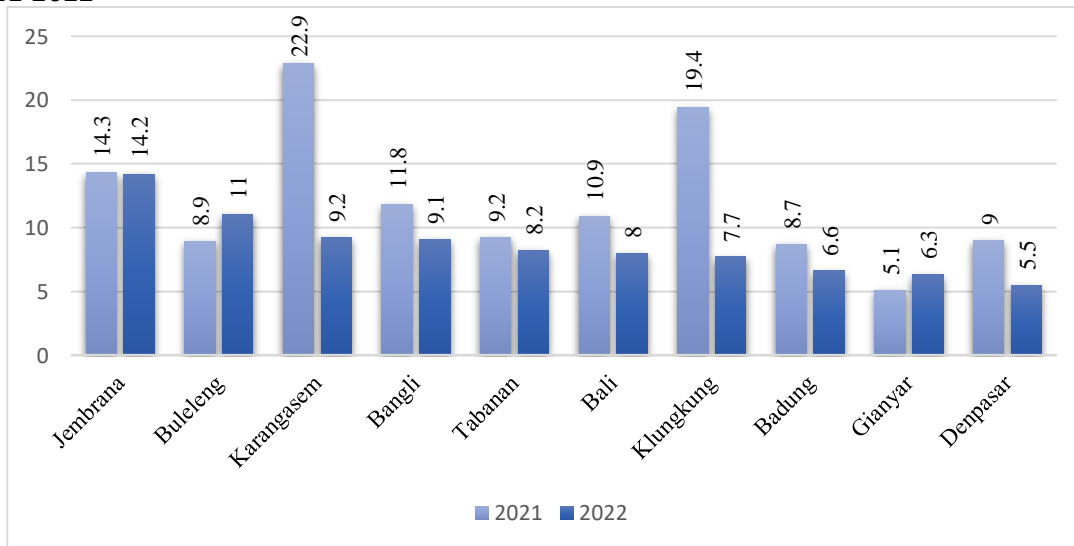to **Figure 2. Stunting prevalence Under Five by Age (%) by Regency/City in Province of Bali in 2022** [5]

Figure 3. Stunting prevalence Toddlers (Height by Age) Based on Districts/Cities in Province of Bali, SSGI 2021-2022

to reduce 10% of total lifetime income and the occurrence of inter-generational poverty can occur due to stunting [6]. Policies that lead to fast economic growth will naturally improve the health condition of a country, which will also encourage economic growth [7]. Economic growth is a concept that narrowly defines an increase in economic output or income, while inclusive growth is growth that can reduce disparities between income groups [8].

This imbalance in the distribution of stunting prevalence rates is related to economic growth in a region. Such as the results of research conducted which found that the number of poor people, the rate of economic growth, and the level of education contribute to the occurrence of stunting in the 10 highest regions of Indonesia [9]. Thus, stunting is not only influenced by factors directly related to health but is also influenced by socio-economic problems at a macro level and the economic conditions of each region, where stunting is more likely to occur in areas or regions with high poverty rates, where areas that are poor tend to have slower economic growth [10]. Also found in a research that economic growth has a direct relationship to poverty and the stunting prevalence in Indonesia. This shows that an increase in economic growth in a region leads to an increase in socio-economic development and improves the welfare of poor households, so that these households can also increase their consumption of nutritious food thereby reducing the stunting prevalence in Indonesia [11].

Based on the above, this study aims to analyze the typology in the Province of Bali, then link the relationship between the stunting prevalence and the results from the Klassen Typology analysis in the Province of Bali, and analyze the relationship between economic growth and the stunting prevalence in the Province of Bali. By using secondary data from several sources, this study will identify regional characteristics based on the stunting prevalence and economic growth, and analyze the relationship between the two variables.

The results of this research are expected to provide input for the government and the community to develop programs and policies that are more targeted in overcoming the problem of stunting in the Province of Bali, while maintaining sustainable and inclusive economic growth.

Stunting (quoted from Presidential Regulation of the Republic of Indonesia Number 72 of 2021) is a disorder of growth and development of children due to chronic malnutrition and recurrent infections, which is characterized by their height below that determined by the minister who administers government affairs in the health sector. Meanwhile, according to the Ministry of Health stunting is a child under five with a z-score value less than -2.00 SD/standard deviation (stunted) and less than -3.00 SD (severely stunted). So, it can be concluded that stunting is a growth disorder experienced by toddlers which results in delays in children's growth that are not in accordance with the standards, resulting in both short-term and long-term impacts.

Economic growth is a process of changing the economic condition of a country on an ongoing basis towards a better condition for a certain period. Underdeveloped area are areas whose territories and communities are less developed than other area on a national scale. Economic growth can also be interpreted as a process of increasing production capacity the economy which is manifested in the form of an increase in national income. Their economic growth is an indication of the success of economic development. Economic development cannot be separated from economic growth, development economic growth encourages economic growth, and conversely, economic growth accelerates smooth process of economic development [12].

Klassen Typology Analysis will be carried out to identify regional characteristics in the Province of Bali based on economic growth and GRDP per capita of the Province of Bali. The Klassen Typology analysis tool is used to describe the pattern and structure of economic growth in each region. The Klassen Typology analysis will be carried out to identify regional characteristics in the Province of Bali based on economic growth and GRDP per capita of the Province of Bali. The Klassen Typology analysis tool is used to describe the pattern and structure of economic growth in each region. The Klassen typology basically divides regions based on two main indicators, namely economic growth on the vertical axis and average per capita income on the horizontal axis. Based on these criteria the observed area can be divided into four regional quadrants, that is:

- Quadrant 1. Fast-developing and fast-growing regions, namely regions that have higher levels of economic growth and income levels than the average regencies/city.

- Quadrant 2. Developing areas are areas that have high growth rates but lower per capita income levels than the average regencies/city.

- Quadrant 3. Developed but depressed regions, namely regions that have higher per capita income, but lower economic growth rates compared to the average regencies/city.

- Quadrant 4. Relatively underdeveloped regions are regions that have lower growth rates and per capita income compared to the regencies/city average.

2. METHODS

This research The research variables that will be identified in this study are the stunting prevalence and economic growth in the Province of Bali, as well as the GRDP per capita of the Province of Bali. The stunting prevalence will be measured using secondary data from the Ministry of Health such as SSGI data 2021-2022, data from the Bali Provincial Health Office 2017-2022, while economic growth and GRDP per capita for Province of Bali will be measured using secondary data from the Central Statistics Agency of Province of Bali.

3.1 Klassen Typology Analysis

The matrix presentation of the Klassen Typology analysis tool can be seen in Table 1 below.

Table 1 Criteria for Klassen Typology Analysis

GRDP per capita (y)	$Y_i > Y$	$Y_i < Y$
$r_i > r$	- High income - High growth	- Low income - High growth
$r_i < r$	- High income - Low growth	- Low income - Low growth

If $Y_i > Y$ and $r_i > r$, this means that the area is a developed and fast-growing area.

If $Y_i > Y$ and $r_i < r$, this means that the area is a developed but depressed area.

If $Y_i < Y$ and $r_i > r$, this means that the area is a developing and fast-growing area.

If $Y_i < Y$ and $r_i < r$, this means that the area is a relatively underdeveloped area.

With the following information:

r_i is a regencies/city economic growth rate

r is the average economic growth of regencies/city in Province of Bali

Y_i is regencies/city GRDP per capita

Y is GRDP per capita on average for districts/cities in the Province of Bali

Furthermore, to find out the pattern of the relationship between economic growth as

measured by Gross Domestic Regional Product (GRDP) per capita and the stunting prevalence in the Province of Bali, the calculation uses the Spearman rank correlation formula. The Spearman rank correlation formula is as follows:

$$rs = 1 - \frac{6\sum D2}{n(n2-1)}$$

Information:

r_s : Rank order correlation coefficient;

1 dan 6: Constant number; and

D : difference between pairs of levels;

N : number of samples.

If the correlation coefficient r_s is zero, then there is no correlation, and if r_s is positive one or negative one, then there is a perfect correlation.

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2. DISCUSSION

Bagian After the GRDP per capita data and the rate of economic growth were processed using SPSS software version 22, the results were found as shown in the following figure

Figure 4 shows that during 2015-2023 most of the regencies/city in Province of Bali were included in quadrants 1 and 2, only Badung regency was included in quadrant 3 and Tabanan regency was included in quadrant 4. The Klassen typology results in 2020 study show Province of Bali as a developed but underdeveloped area, where Badung Regency, Gianyar Regency, Tabanan Regency, Buleleng Regency and Denpasar City are developed areas, while other Regencies are included in underdeveloped areas [13]. Another study that using Klassen typology also stated, areas that are classified as rapidly developing, namely Denpasar City, Badung Regency, and Gianyar Regency, while Buleleng Regency is included in the category of fast developing areas, Jembrana Regency and Tabanan Regency are classified as areas with potential for development. But Klungkung Regency, Bangli Regency and Karangasem Regency are classified as relatively underdeveloped areas [14]. Human Development Index in the Province of Bali with

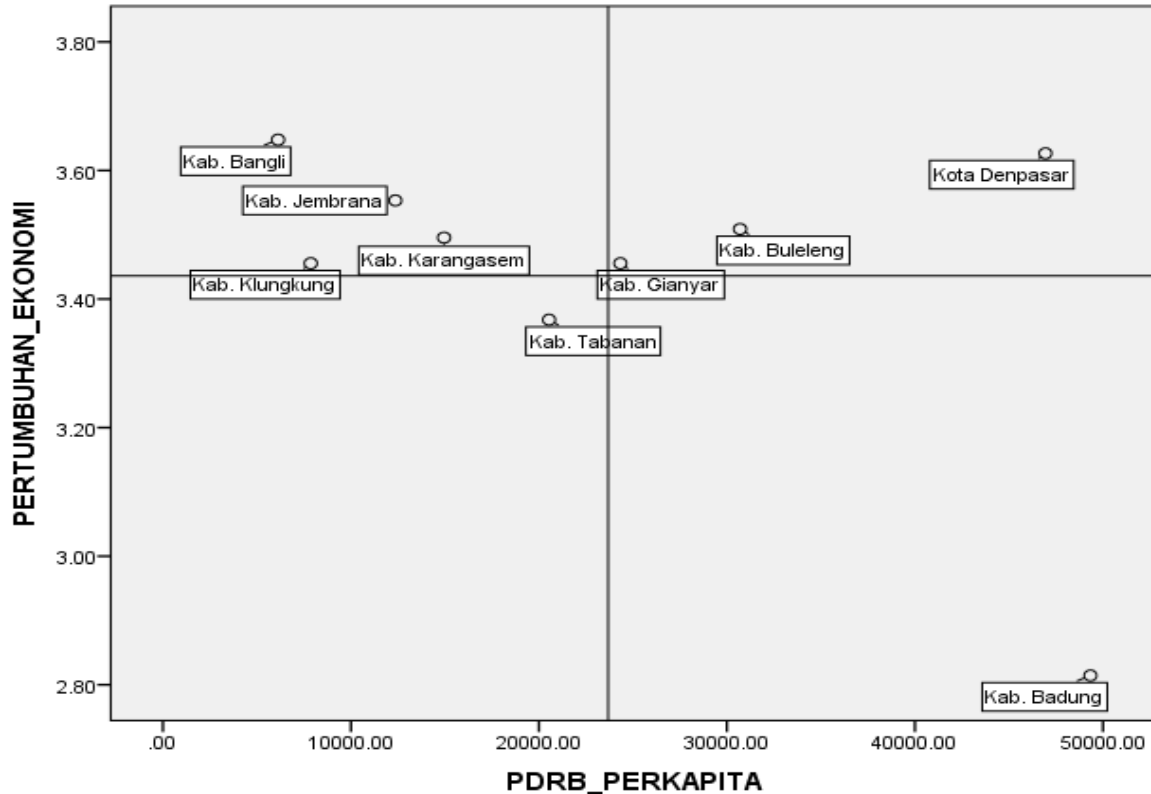**Figure 4. Klassen's Typology Analysis Result**

Klassen typology analysis found that the Province of Bali can be classified into two, namely areas of rapid development and growth (Denpasar City, Tabanan Regency, Gianyar Regency, and Badung Regency) and areas relatively lagging behind, namely Karangasem Regency, Bangli Regency, Klungkung Regency, Jembrana Regency, and Buleleng Regency [15]. Based on result above, Badung Regency is included in quadrant 3, developed but depressed regions, maybe it's because in 2020-2023, as stated in the Badung Regency Strategic Indicators Booklet 2018-2022, Badung's economic growth rate for the 2018-2022 period has fluctuated, where in 2020 the rate Badung's economic growth reached minus 16.55% due to the Covid-19 pandemic and starting to increase in 2021 even though it is still minus 6.74% [16]. In detail, the results of the Klassen Typology

Analysis obtained in this study can be described as follows:

- Quadrant 1. Fast-developing and fast-growing regions are regions that have higher levels of economic growth and income levels than the average Regencies/city. The areas in Quadrant 1 are Denpasar City, Buleleng Regency, and Gianyar Regency.

- Quadrant 2. Developing areas are areas that have high growth rates but lower per capita income levels than the average Regencies/city. The areas in Quadrant 2 are Bangli Regency, Jembrana Regency, Karangasem Regency, Klungkung Regency.

- Quadrant 3. Developed but depressed regions, namely regions that have higher per capita income, but lower economic

Table 2. Data on Stunting Prevalence in Province of Bali 2013-2022 and Results of Klassen Typology Analysis[5]

No	Regency/City	Year						Klassen Typology Region
		2013	2018	2019	2020	2021	2022	
1	Jembrana	34.0	29.10	19.20		14.30	10.6	2
2	Tabanan	32.7	16.20	18.58		9.20	6.4	4
3	Badung	35.0	25.20	10.83		8.70	5.6	3
4	Gianyar	41.0	12.10	11.10		5.10	4.8	1
5	Klungkung	19.3	21.40	12.86		19.40	5.7	2
6	Bangli	40.0	43.20	23.01		11.80	5.8	2
7	Karangasem	39.1	26.20	15.75		22.90	7.3	2
8	Buleleng	35.6	20.50	22.05		8.90	10.3	1
9	Denpasar	28.8	18.80	14.48		9.00	5.1	1
	BALI	32.6	21.90	14.42	13.68	10.90	8.1	

growth rates compared to the average regencies/city. The area included in Quadrant 3 is Badung Regency.

- Quadrant 4. Relatively underdeveloped regions are regions that have lower growth rates and per capita income compared to the regencies/city average. The area included in Quadrant 4 is Tabanan Regency

Based on regional typology analysis and if it is linked to the stunting prevalence data above, it can be concluded that Buleleng is an advanced area with a high stunting rate of 10.30%. Meanwhile, the Tabanan area is relatively underdeveloped, but the stunting rate is below the provincial average of 6.6%. Klungkung, Bangli and Karangasem districts are developing areas that have a stunting prevalence rate below the provincial stunting prevalence rate, however, Jembrana Regency has a stunting prevalence rate of 10.6%, the highest in the Bali region. Only Denpasar City and Gianyar Regency are developed areas which have relatively low prevalence rates compared to provincial prevalence rates.

4.1 Results of Spearman's Rank Analysis to Test the Relationship Between GRDP Per Capita and Economic Growth with the Stunting prevalence in the Province of Bali

From the results of the analysis conducted using the Klassen Typology Analysis, then a correlation analysis was performed between GRDP per capita and economic growth and the stunting prevalence to find out whether there is a relationship between GRDP per capita and the stunting prevalence in regency/city in the Province of Bali, and is there a relationship between growth economy with the stunting prevalence in the Province of Bali.

The results of Spearman's Rank analysis show that both GRDP per capita and economic growth each have a sig value > 0.05, which means that there is no correlation between GRDP per capita, economic growth and the stunting prevalence, as below in Table 7.

Research in sub-Saharan Africa found that there was no significant relationship between economic growth and children's nutritional status [17].

Policies related to economic growth will only be effective in reducing the stunting prevalence if an increase in national income is directed at improving children's diets, overcoming gender inequality and strengthening women's status, improving sanitation and reducing poverty and inequality [18]. There is no strong correlation between GRDP per capita as a proxy for economic growth and the prevalence rate of stunting, poverty, and the Human Development Index (HDI), therefore the government needs to strengthen the implementation of inclusive development so that the impact of growth the economy can be felt accompanied by an increase in HDI and a decrease in poverty and the stunting prevalence evenly [19]

Based on the research results obtained several things as follows:

1) If we link the results of the Klassen Typology analysis with the stunting prevalence, it can be seen that developed regions such as Buleleng have a high stunting rate of 10.30%. Meanwhile, Tabanan is a relatively underdeveloped area, but its stunting is below the provincial average of 6.6%.

2) The results of the Spearman test show that the significance value of each of the two variables for the stunting prevalence is greater than 0.05, which means that the GDP per capita variables with stunting and economic growth with stunting are not correlated.

Thus, further research is needed regarding other facts regarding the stunting prevalence in the Province of Bali, so that it can provide a clear picture of the variables that influence the stunting prevalence in each district/city.

Table 6 Results of Spearman's Rank Analysis Between Per Capita GRDP and Stunting Prevalence in Province of Bali

		GRDP_PERCAPITA	STUNTING
GRDP_PERCAPITA	Pearson Correlation	1	-.211
	Sig. (2-tailed)		.585
	N	9	9
STUNTING	Pearson Correlation	-.211	1
	Sig. (2-tailed)	.585	
	N	9	9

Table 7 Results of Spearman's Rank Analysis Between Economic Growth and Stunting Prevalence in Province of Bali

		STUNTING	ECONOMIC_GROWTH
STUNTING	Pearson Correlation	1	.210
	Sig. (2-tailed)		.587
	N	9	9
ECONOMIC_GROWTH	Pearson Correlation	.210	1
	Sig. (2-tailed)	.587	
	N	9	9

4. CONCLUSION

Based Based on the research results obtained several things as follows:

1) If we link the results of the Klassen Typology analysis with the stunting prevalence, it can be seen that developed regions such as Buleleng have a high stunting rate of 10.30%. Meanwhile, Tabanan is a relatively underdeveloped area, but its stunting is below the provincial average of 6.6%.

2) The results of the Spearman test show that the significance value of each of the two variables for the stunting prevalence is greater than 0.05, which means that the GDP per capita variables with stunting and economic growth with stunting are not correlated.

3) Thus, further research is needed regarding other facts regarding the stunting prevalence in the Province of Bali, so that it can provide a clear picture of the variables that influence the stunting prevalence in each district/city.

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