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Original Article

Analysis Factor Dominance and Contribution Program Performance against Stunting Incidents in Bali Province: SSGI Data Analysis

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ABSTRACT

Since in 2017, Bali Province has consistency occupy ranking First the lowest prevalence of stunting in Indonesia. Effort to decline the prevalence of stunting in Bali Province remain get attention Serious. Planned program need explore and identify factor specific trigger the occurrence of stunting. Data used in research This is secondary data results Study of Indonesia's Nutritional Status in Provinces. Analysis carried out includes: Analysis Univariate and Analysis Multivariate use analysis backward method logistic regression. Analysis results factor determination and evaluation the performance of the Nutrition and Health Program in Bali Province shows giving factors contribution to The problem of stunting in Bali is : (a) area of location stay (aOR= 1.57; 95%CI= 1.31 - 1.89); (b) PMT Share Mother pregnant (aOR= 0.55; 95% CI= 0.39 - 0.78); (c) Inspection Pregnancy (aOR= 0.83; 95%CI= 0.61 - 1.14); (d) Birth Status (AOR= 1.52; 95%CI= 1.22 - 1.90); (e) Body length at birth (aOR= 1.54 - 2.11); (f) Birth weight (aOR = 2.48; 95%CI= 1.71 - 3.58); (g) Variety Consumption Toddlers (aOR= 1.65; 95%CI= 1.36 - 2.00); and (h) Immunization Program (aOR=. 0.69; 95%CI= 0.51 - 0.96). Potency stunting has occurred happen before baby born, because that's necessary recommended for develop priority programs for women age fertile and maternal pregnant.

Keywords: *Stunting, Determinants, Contribution Program Performance*

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INTRODUCTION

Stunting is a problem in nutrition that occurs in almost all countries, including Indonesia. If compared to ASEAN countries, the prevalence of stunting in Indonesia is still lower compared to Timor Leste (48.8%), but Still taller than Vietnam (22.3%), Malaysia (20.9%), Thailand (12.3%), and Singapore (2.8%).[1]

Some developing countries show toddler stunting levels: in Bangladesh, it is 26%, in India, 26% to 24.3%, and in Nepal, 24.3%. In contrast, the Toddler stunting level weight in Bangladesh is 15.2%, in India 23.7%, and in Nepal 15.9 %.[2]

Up to 2021, only six provinces in Indonesia had a prevalence of stunting below the standard 20% determined by the World Health Organization: Bangka Belitung Islands, Lampung, Riau Islands, Yogyakarta, Jakarta, and Bali. Furthermore, in 2022, this number will increase to 12 provinces: Banten, Bengkulu, East Java, South Sumatra, and Kep. Bangka Belitung, Jambi, Riau, Yogyakarta, Kep. Riau, Lampung, Jakarta and Bali.[3,4]

Since 2017, Bali Province has consistently been the province with the lowest prevalence of stunting in Indonesia. The prevalence of stunting in Bali decreases from year to year. Based on monitoring nutritional status in 2016, the prevalence of stunting in Bali amounted to 19.7%.[5] In 2021 it will decrease to 10.9%[4] and SSGI 2022 decreases to 8%. So that the prevalence of stunting can be lowered Again, the planned program needs to explore and identify other good factors that do not directly trigger the occurrence of stunting.[6]

Growth and development as a child are influenced by factors heredity and environment. Research by Dubois et al, in 2012 showed that a child's body length moment born was influenced by factors genetic by 4-7%, especially in children Woman. Rather, the percentage baby size women is very high (74.87%) influenced by variables of environment moment born. Other researchers say that stunting is caused by various causes factors. LBW Factor (low birth weight), expenditure family, access to proper sanitation, and access to adequate drinking water a factor related to stunting. So, variable the will be used in research This as suspected factor's own connection to stunting incident. [7–14]

Stunting has an impact negative period short and term long. Stunting causes damage to the brain, obstacles to growth and development, and enhancement vulnerability to chronic disease in adulthood. Their level more education compared to children in general so matter also contributes to low income in adulthood.[15] Remember the impacts of this, the Indonesian government is committed to overcoming it, which is poured into the plan development period intermediate 2015-2019 and 2020-2024.[16,17] Stunting prevention programs are then implemented in a national strategy to overcome internal stunting through nutrition-specific, nutrition-sensitive, and interventional convergence by institutions inter-agency.[18] In the article, the researcher analyses the factors contributing to stunting in Bali Province and evaluates the program's effectiveness in reducing stunting incidence based on 2022 SSGI data.

METHOD

The research uses secondary data from the SSGI (Indonesian Nutritional Status Study) results in Bali Province in 2022. These cross-sectional data are likely to show significant connections with stunting incidence in 2022. The data collected in the SSGI 2022 are used to obtain nutritional status indicators and nutrition-specific and sensitive intervention indicators.

The data collection for SSGI 2022 took around 2.5 months, from September to November 2022. Enumerators from various districts and cities were responsible for 18-20 census blocks each. The interviews were paperless, with enumerators inputting data directly into an Android-based entry program on handheld phones. Once the interviews and measurements were completed in a census block, the data was sent to the BKPK server. After the data was collected and managed centrally by the team, it was cleaned and made ready for analysis. The analyzed data was weighted by the BPS team.

The study's analysis included univariate analysis to describe each variable's characteristics and multivariate analysis using the backward method of logistic regression.

RESULTS

Based on the analysis factor risk results with the method regression logistics, 16 characteristics of the population studied have a different prevalence of stunting among significant subpopulations. Details are presented in full in Table 1.

Table 1. Distribution Stunting prevalence based on characteristics of sub- populations in Bali

Characteristics	Sub Population	Prevalence of Stunting (%)	95%CI	Chi-square (p-value)	Odds Ratio (95% CI)
Type Sex	Woman	7.4	6.6 – 8.4	2.29	1,146
	Man	8.4	7.5 – 9.5	(0.13)	(0.960- 1.368)
Group Age	No Badass	8.9	8.1 – 9.9	16,807	0.687
	Badass	6.3	5.5 – 7.3	(0.00)	(0.574 – 0.822)
Birth Status	Enough month	7.1	6.4 – 7.8	26,247	1,783
	Not enough month	11.9	10.0 – 14.2	(0.00)	(1.429 – 2.225)
Heavy Born	Normal	7.0	6.3 - 7.7	56,770	3,320
	Low (LBW)	20.6	16.3 – 25.8	(0.00)	(2,429 – 4,538)
Birth Length	Normal	7.1	6.4 – 7.8	37,873	2,253
	Short (PBLP)	15.1	12.4 – 18.4	(0.00)	(1,739 – 2,918)
Once sick (1 year final)	No Once	5.9	4.5 – 7.6	5,805	1,431
	Once	8.2	7.5 – 9.0	(0.02)	(1,069 – 1,917)
Place Stay	Urban	6,8	6.0 - 7.6	32,960	1,720
	Rural	11.1	9.8 - 12.5	(0.00)	(1,429 - 2,070)
Father's Education	High/ Intermediate	7.4	6.7 – 8.2	23,776	1,705
	Basic// No school	12.0	10.1 – 14.2	(0.00)	(1,375 – 2,113)
Mother's Education	High/ Intermediate	7.3	6.6 – 8.1	21,429	1,628
	Basic// No school	11.4	9.7 – 13.3	(0.00)	(1,324 – 2,001)
Father's occupation	Work	8.0	7.3 – 8.7	0.604	0.715
	No Work	5.8	2.6 – 12.6	(0.44)	(0.306 – 1.668)
Work Mother	Work	7.2	6.4 – 8.0	11,674	1,363
	No Work	9.5	8.4 – 10.8	(0.00)	(1.141 – 1.627)
Age Mother at giving birth	Risk Low	5.7	4.2 – 7.6	5,698 (0.02)	1,477
	High Risk	8.2	7.5 – 8.9		(1,072 – 2,036)
Access Service Health	Easy	8.0	7.1 – 9.0	0.024	0.986
	Difficult	7.9	7.0 – 8.9	(0.88)	(0.827 – 1.175)
Place Get treatment Toddler	Health Facilities Gov.	8.2	7.5 – 9.0	5,123	0.725
	Health Facilities other	6.1	4.8 – 7.8	(0.02)	(0.548 – 0.958)
Guarantee Health	There is	7.0	6.3 – 7.9	12,358	1,387
	No	9.5	8.4 - 10.7	(0.00)	(1.156 – 1.665)
Resilience Food Family	Enough	6.3	5.5 - 7.2	35,455	1,772
	Not enough	10.6	9.5 - 11.9	(0.00)	(1,468 - 2,140)
Sanitation Environment	Worthy	7.8	7.1 – 8.6	0.590	1,096
	No Worthy	8.5	7.0 – 10.4	(0.44)	(0.867 – 1.384)
Source of Drinking Water	Fulfil Condition	8.0	7.3 – 8.8	0.407	0.919
	No Fulfil	7.4	5.9 – 9.3	(0.52)	(0.710 – 1.190)

Source: SSGI Bali Province, 2022

However, of the 16 potential characteristics that trigger stunting, after analyzing regression logistics with the backward method, only five variables have contribution significance in stunting estimation models, as presented in the table following.

Table 2. Variables that have contribution significant in the Stunting estimation model in Bali Province

Parameter	Exp(B)	Sig.	d	Exp(B)	Sig.	d
Birth Weight	2,475	0,000	1%	3,094	0,000	-24%
Body length at birth	1,541	0.004	0%			
Location Area stay	1,569	0,000	-1%	1,577	0,000	0%
Birth Status	1,522	0,000	-2%	1,531	0,000	-2%
Variety Consumption	1,653	0,000	-4%	1,625	0,000	1%

Source: SSGI Bali Province, 2022

Like presented in table 2, the backward analysis was stopped when emit characteristics birth length from the estimation model. If this factor is removed

from the model then there will be a change in the OR (Exp(β)) in the low birth weight factor from the original 2.475 to 3.094 (a 20% change). Thus, a model will be formed if the body length factor is removed from the model. estimation of stunting factors that are not fulfil condition modeling (OR changes more than 10%). This means that the factors predicting stunting based on the analysis results consist of five factors, namely Birth Weight; Body length at birth; Area of Residence; Birth Status; and variety of consumption.

whereas for nutrition and health programs, of the 11 successful programs identified, only 9 programs are performing and contribute to prevalence, with details in full presented in Table 3.

Table 3. Contribution Program performance against prevalence of stunting in Bali Province

No	Nutrition Program and Health	Performance	Prevalence of Stunting		Chi-square (p-value)	Odds Ratio (95% CI)
			(%)	95%CI		
1	Inspection Pregnancy	Complete	6.2	5.4 – 7.2	19,111	1,488
		No complete	9.0	8.1 – 9.9	(0.00)	(1,245 – 1,779)
2	Maternal TTD Distribution to Pregnant	According to the Program	5.8	4.6 – 7.1	10,323 (0.00)	1,492 (1,169 – 1,905)
		No in accordance	8.4	7.6 – 9.1		
3	Distribution of Pregnant Women's PMT	Given	5.4	4.6 – 6.5	24,825 (0.00)	1,727 (1,393 – 2,141)
		No given	9.0	8.2 – 9.9		
4	Initiation Early Breastfeeding	Done	5,6	4.4 – 7.1	9,917	1,566
		No	8.5	7.7 – 9.3	(0.00)	(1.184 - 2.071)
5	Giving Colostrum	Done	6.2	5.4 – 7.2	15,206	1,453
		No	8.9	8.0 – 9.8	(0.00)	(1,204 – 1,753)
6	Exclusive breastfeeding	Done	5.9	4.2 – 8.1	3,534 (0.06)	1,415 (0.985 – 2.033)
		No	8.1	7.4 – 8.9		
7	Age Weaning	In accordance standard	7.6	6.2 – 9.2	0.294 (0.59)	1,066 (0.845 - 1.346)
		No in accordance	8.0	7.3 – 8.8		
8	Ownership KIA book	Have	7.7	5.1 – 11.4	0.027	1,039
		Don't have	8.0	7.3 – 8.7	(0.87)	(0.657 – 1.645)
9	Weighing Toddler	In accordance Standard	7.4	6.5 – 8.4	3,033 (0.08)	1,172 (0.980 – 1.402)
		No In accordance	8.5	7.7 – 9.5		
10	Package Immunization	Complete	5.3	4.2 – 6.6	14,657 (0.00)	1,680
		No Complete	8.6	7.8 – 9.4		(1,288 – 2,192)
11	Distribution of Vitamin A	Can	7.0	5.9 – 8.2	3,570	1,228
		No Can	8.5	7.6 – 9.4	(0.06)	(0.992 – 1.519)

Source: SSGI Bali Province, 2022

Once done analysis regression with backward method only remaining three programs that have contribution significance in stunting estimation models such as presented in Table 4

Table 4. Contributing programs significance to prevalence in the Stunting estimation model in Bali Province

Parameter	Exp(B)	Sig.	d	Exp(B)	Sig.	D
PMT Pregnant Women	0.553	0.001	0.5%	**0.642**	**0,000**	**-16.0%**
Basic Immunization	0.699	0.025	-0.1%	0.733	0.038	-4.9%
Inspection Pregnancy	**0.834**	**0.250**	**8.6%**			

As presented in table 2, the backward analysis was stopped when removing the pregnancy screening program from the estimation model. If the pregnancy screening program is removed from the model, there will be a change in the OR (Exp (β)) in the PMT program for Pregnant Women from 0.553 to 0.642 (a change of -16.0%) thus, if the pregnancy screening program is removed from the model. then an estimation model will be formed that does not meet the modeling requirements (OR change more than 10%). This means that the programs that contribute to the acceleration of stunting reduction based on the analysis results consist of three programs, namely PMT for Pregnant Women, Basic Immunization, and Pregnancy Examination

DISCUSSION

When sorted based on chronological order, we can see that the risk of stunting actually occurs before the fetus is born. Providing maternal PMT during pregnancy and conducting prenatal examinations is crucial for ensuring the quality of pregnancy. Failing to do so may potentially lead to the birth of babies with below standard body weight and length, and even premature birth (not enough months). Most women consume food that does not meet the recommended nutritional intake before and during pregnancy. The key message for a balanced nutrition during pregnancy is "eat more of the right foods, not just more food." Balanced nutrition during pregnancy can potentially reduce the risk of pregnancy complications. An analysis of 1489 samples from a cohort of pregnant mothers in China shows that 71 (4.8%) suffer from gestational hypertension (GH) and 163 (10.9%) suffer from Gestational Diabetes Mellitus (GDM). Statistical analysis indicates that those who adhere to recommended nutritional intake guidelines in the second trimester are associated with a reduced risk of GH [OR=0.30; 95% CI: 0.20 - 0.37) and GDM [OR=0.38; 95% CI: 0.31 - 0.48].[19] It's important to provide additional food assistance to pregnant mothers (PMT). In addition, consuming nutrients containing various micronutrients combined with balanced protein energy is especially beneficial for pregnant mothers. Eating a poor diet has been linked to a decreased risk of pregnancy complications and improved birth quality, including a lower number of low birth weight cases. [20].

During pregnancy, mother experience various change and physiological triggers enhancement need the nutrition. However, must underlined that enhancement This No simply only on intake substance nutrition macro. In fact, it's more important is increase intake of vitamins, minerals and essential fatty acids. Vitamins, minerals and especially omega-3 fatty acids very important For Lots activity cellular and metabolic (differentiation cells, proliferation, hemoglobin production, transport oxygen, and mineralization). Therefore that, mother pregnant must arrange intake keep the food steady fulfil adequacy substance nutrition micro. That's why, gift food addition especially when accompanied with supplements containing substance nutrition micro role important For ensure normal pregnancy progress and to prevent complications pregnancy.[21]

Study results literature based on Medline, PubMed, Public Library of Science (PLOS) and Google Scholar databases during the period February 01,

1995 to March 01, 2017 used the keywords "pregnancy," "supplements," "omega 3 fatty acids," and "clinical trials." find influence omega 3 fatty acids during pregnancy or early period postpartum to duration pregnancy and size baby moment birth, preeclampsia, depression, as well function vision and development nerve baby. Because of its importance these fatty acids for Mother pregnant or breastfeeding, fetus, and infant new born as well as limited data from clinical trials evaluating it its influence to pregnancy and babies, research addition required for determine more optimal intake Good. Especially ratio higher intake of EPA (Eicosapentaenoic Acid) and DHA (Docosahexaenoic Acid) Specific during period critical This [22].

Besides giving food additions and supplements, examination pregnancy (ANC=Antenatal Care) also contributes to stunting problem. ANC visits in person regular potential increase continuity life mother and child, because ANC offers series service that can prevent as well as detect and treat factor risk since beginning pregnancy.[23] Observation result against 8321 children toddlers in Bangladesh concluded that inspection carried out pregnancy not enough from seven times during pregnancy relate negative with child's z score based on Height index according to Age, otherwise on examination pregnancy seven times or more relate positive with child's z score based on Height index according to Age [24].

After baby born, factor birth weight low birth weight (LBW) is known is factor most importantly in trigger stunting problem. LBW status indeed has long been recognized as predictor main trigger disturbance optimal growth of babies and toddlers. National Health Survey Results Family in India concludes that LBW babies have possibly 19% more tall For experiencing stunting (aOR=1.19; 95% CI=1.14-1.24) compared to with baby with normal [25]The results of research in Sub-Saharan African countries also show this same result. Once done control to variable confounding, known that children with birth weight low will experience an enhancement risk of stunting [aOR=1.68, 95% CI=1.58–1.78], underweight [aOR=1.82, 95% CI=1.70–1.94], and wasting [aOR=1.35, 95% CI=1.20–1.38].[26]

LBW status itself basically is indicator the bad ANC quality. Analysis results determinant LBW factors based on Survey Indonesia's Demography and Health shows that lack of ANC checks from four visits [aOR= 1.86; 95% CI=1.44–2.42], Minimal education nutrition and health [aOR= 2.09; 95% CI=1.00–4.37], and mothers only finished school baseline [aOR= 1.45; 95% CI=1.05–2.00] associated tightly with LBW [27]. Meta-analysis results to publication results research in Ethiopia also shows results similar. The incidence of LBW is very high related with with type sex baby new birth, opportunity more high in babies female (OR = 1.5 (95%CI = 1.2, 1.7)), prematurity (OR = 4.7 (95%CI = 1.5, 14.5)), no do inspection pregnancy (OR = 1.7 (95%CI= 1.4, 2.2)), hypertension consequence pregnancy (OR = 6.7 (95% CI = 3.5, 12.9)), and infant new born to his mother originate from area rural areas (OR = 1.8 (95 % CI =1.2, 2.6) [28]Results findings This Actually imply that the incidence of LBW is intermediate problems of stunting problem. Effort prevention and control of stunting is not will bring results effective if LBW problem yet Can resolved.

The results of the 2022 SSGI analysis conclude that variety consumption give contribution significant to stunting problem in Bali. Variety consumption it turns out No related with social status economy family, Income family No relate with stunting due to in his spending income family No fully allocated For fulfilment need food family. Toddler with economic status family class lower Not yet, Of course, experiencing stunting. If shopping for material food managed with Good so that a menu that is cheap, simple, varied, and fixed contains mark nutrition balanced impact Good to toddler [7] Level of education neither did mother always relate with knowledge about

stunting. A study show that No there is connection significant between level education Mother with stunting incidence, however, there is connection significant between level of knowledge Mother about nutrition with incidence of stunting.[10] Knowledge level Mother about food Healthy as well as nutritious become reason child experience lack substance nutrition, besides That lack of knowledge Mother about consume vitamins and minerals when You can get pregnant too influence growth fetus so that become reason base child experiencing stunting. Research result state that amount Mothers with knowledge nutrition good balance own stunting toddlers more little, p This because lack of knowledge Mother will nutrition balanced will influence one of them to type, frequency, and amount food given to child so that can influential on nutritional status a child.[10,12,13] Findings This contain meaning that education Nutrition balance still required in effort acceleration reducing stunting with target Good those with income tall or low nor those who are educated tall or low.

After a baby is born, the surrounding environment can significantly influence their growth and development. This is evident in the difference in the risk of stunting between babies born in rural and urban areas, which is influenced by disparities in health services availability. According to the results of the Basic Health Research study in 2018, socio-demographic factors and access to health services are related to the issue of stunting in Bali. The difference in levels of women's education, sufficient consumption of iron tablets during pregnancy, and family involvement in parenting are determinants of the disparity in the incidence of stunting in urban areas in Bali.[29]

The analysis of SSGI 2022 results shows that the immunization program has played a significant role in reducing stunting in Bali. Immunization involves administering vaccines to protect the body and build immunity against infectious diseases. It is important to recognize that any efforts to reduce stunting will not be effective if a child's natural defense mechanisms are weak. The 2018 basic health research analysis identified certain factors that, while not directly causing stunting, can contribute to its prevalence. For example, low-quality water sources and lack of proper sanitation facilities are interrelated issues. When clean water sources are scarce, communities, particularly in rural areas, may rely on public water sources, leading to further deterioration of water quality. This can result in frequent infections, particularly in babies and young children, due to exposure to pathogens in an unhygienic environment. Chronic exposure to these pathogens is suspected to contribute to growth disturbances and stunting problems.[29]

CONCLUSIONS

Based on results analysis factor determination and evaluation The performance of the Nutrition and Health Program in Bali Province refers to the 2022 SSGI results. It is known giving factors contribution to stunting problem in Bali, in general chronological successively are: (a) the area of the place stay; (b) Giving Food Addition For Mother pregnant; (c) Inspection Pregnancy; (d) Birth Status; (e) Body length at birth; (f) Birth weight; (g) Variety Consumption Toddlers; and (h) Immunization Program.

From the study, This obtained potency stunting even occurs Already happen before baby born. Therefore that, deep frame success of the acceleration program reducing stunting, necessary recommended For develop programs that are good in nature specific, for example increase scope immunization, consumption of Fe tablets since youth, monitoring and improvement intake nutrition Mother pregnant or those that are sensitive, for example, repair quality sanitation environment, guarantee availability food on the market, improvements environment settlements, so

that the acceleration target stunting can be reduced achieved optimally Possible.

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CONFLICT OF INTEREST

The authors declare no conflict of interest

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