

## STUNTED AND STIMULATION AFFECT CHILD DEVELOPMENT IN JENEPONTO DISTRICT, INDONESIA

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### ABSTRACT

*Objective:* Stunting is a chronic nutritional deficiency that causes a long term effect. This study aims to look at the relationship between stunting, stimulation, and punishment from parents on child development.

*Methods:* This study is a follow-up of previously intervention design, with a sample of 340 children in Jeneponto District. Child development is measured using the instrument of CREDI (Caregiver Report Early Development Instrument). Determination of nutritional status uses the WHO anthro 2005 application.

*Result:* The results showed that all aspects of development namely motor, cognitive and socioemotional were influenced by the provision of stimulation, where had an average score is  $4.82 \pm 0.45$ ;  $17.11 \pm 1.38$ ; and  $15.81 \pm 3.06$  respectively ( $p = 0.00$ ). As for nutritional status, children's motor development is associated with the incidence of stunting, underweight, and wasting with an average value of  $4.65 \pm 0.70$ ;  $4.60 \pm 0.75$ ; and  $4.55 \pm 0.77$  respectively ( $p < 0.05$ ).

*Conclusion:* Stunting and stimulation by parents affect the child's development from all aspects.

**KEYWORDS:** Development; Stimulation; Stunting.

### I. INTRODUCTION

Child development factors are also used as an important indicator in assessing the health and well-being of a country.<sup>1</sup> In Indonesia, child development is still low compared to other countries, where the total development index for children aged 36 - 59 months in Indonesia in 2018 was 88.3% including the language index only reaching 64.6%, the physical development index (fine and gross motor skills) of 97.8 %, the social-emotional index was 69.6% and the cognitive index was 95.2%.<sup>2</sup>

The incidence of stunting or chronic malnutrition in children will have a bad impact on the condition of the child in adulthood until old age.<sup>3</sup> One impact is Developmental factors, which include reduced productivity and it will reduce economic income at the household level to a national level.<sup>4</sup> The incidence of stunting will also reduce neurocognitive function in children and reduce capacity and productivity in learning.<sup>5</sup> Apart from stunted, stimulating factors from parents also contribute more to children's development. Stimulation was a factor of a child's external environment, which is part of the child's need for sustainable training or activities to stimulate the basic abilities of children aged 0-6 years so that the child grows and develops optimally. Every child needs to get routine stimulation as early as possible and continuously at every opportunity.<sup>6</sup> Therefore, this study aims to look at the relationship between the incidence of child stunting and the stimulation given by parents to the child's development.

## II. METHODS

This study is a follow-up of previous nutritional intervention studies that also measure child development. This research was conducted in 6 sub-districts (Tamalatea, Bangkala, Bontoramba, Binamu, Tarawang, and Kelara) in Jenepono district, South Sulawesi, Indonesia. The number of samples in this study was 340 children aged 24-36 months who were evenly distributed in each district in the study location. Child development was measured using the CREDI (Caregiver Report Early Development Instruments) instrument which had been adapted and tested the reliability and validity of the questionnaire for use in the location of this study.<sup>7</sup> The assessment of child stimulation used stimulation from SDIDTK (*Stimulasi, Deteksi dan Intervensi Dini Tumbuh Kembang*) or (Stimulation, Detection and Early Intervention Child Development Growth) which is a standard instrument from the Indonesian Ministry of Health for use at the primary level or in the community.<sup>8</sup> The research data collection used interview methods and practices for assessment of child development. As for the assessment of development was calculating all the scores of question items from each aspect, namely cognitive, motor, and socio-emotional. Assessment of child stimulation based on the age level contained in the SDIDTK book. The assessment of stunting in children refers to the standard from WHO, namely <-2 height for age z score, the conversion of the z score was using the WHO Anthro 2005 application. Analysis of Univariate, bivariate, and multivariate uses a data processing application, namely SPSS 25.

## III. RESULT

The results of this study indicate the nutritional status of children, where the children stunted were 146 (42.9%), those who experienced malnutrition were 112 (32.9%), and wasted was 47 (13.8%). Meanwhile, children who received the punishment of their parents were 228 (67.1%), on the other hand, children who received sufficient stimulation of their parents were 199 (58.5%). Furthermore, children's development as measured using the CREDI instrument is divided into 3 aspects, namely motor, cognitive, and socio-emotional aspects. The CREDI instrument uses numerical data so that the mean motor, cognitive, and socioemotional scores were 4.70±0.62; 16.60±2.06; and 14.90±3.40 respectively (see table 1). In this study, using 2 were bivariate and multivariate analysis to control for confounding variables of the relationship between the independent variable and the dependent variable.

**Table 1** Univariate analysis of mothers and children characteristics.

Variables	N (%) or Mean±SD
Mothers	
Mother's education	
Low	232 (68.2)
Higher	108 (31.8)
Mother's height	152±5.22
Intervention	
PG (Powder moringa)	114 (33.5)
EG (Extract moringa)	107 (31.5)
IG (Iron folat)	119 (35)
Children	
Birth Weight	
LBW (Low Birth Weight)	15 (4.4)
Normal	325 (95.6)
Birth Length	1.19±0.3
<48 cm	66 (19.4)
>48 cm	274 (80.6)
Breastfed	
Non Exclusive	150 (44.1)
Exclusive	190 (55.9)
Immunization	
Not Complete	173 (50.9)
Complete	167 (49.1)
Anthropometric and Follow-up	
HAZ (Height for age z score)	1.57±0.49
Stunted	146 (42.9)
Normal	194 (57.1)
WAZ (Weight for age z score)	1.67±0.47
Underweight	112 (32.9)
Normal	228 (57.1)
WHZ (Weight for Height z score)	1.86±0.34

Wasted	47 (13.8)
Normal	293 (86.2)
Stimulation	74.77±13.43
Less	141 (41.5)
Enough	199 (58.5)
Punishment	
Yes	228 (67.1)
None	112 (32.9)
CREDI Score	
Motor	4.70±0.62
Cognitive	16.60±2.06
Sosioemotional	14.90±3.40

First, in the bivariate analysis (see table 2) it was found that there was a relationship between the provision of child stimulation to all aspects of child development, namely 4.53±0.77 (p = 0.00), 15.87±2.58 (p = 0.00), and 13.63±3.46 (p = 0.00) respectively. Besides, there was a relationship between the incidence of stunting and aspects of motor and socio-emotional development, namely 4.65±0.70 (p = 0.01) and 14.66±3.68 (p = 0.00). Furthermore, there are relationships between the children received punishment and all aspects of development, namely 4.65±0.70 (p = 0.00), 16.37±2.24 (p = 0.00) and 14.41±3.44 (p = 0.00) respectively. The results of the multivariate analysis using a dummy regression test (see table 3) found that the stimulation and incidence of stunting in children given by parents affect the child's development. The stimulation was protective factors in the motor aspects (OR = 0.23 and p-value = 0.00), be a risk factor for the cognitive and socio-emotional aspects, namely (OR = 1.05 and p-value = 0.00) and (OR = 1.65 and p-value = 0.00). so it means that as better as stimulation will increase the child's development score. The incidence of stunting in children was a protective factor for all aspects of child development, namely (OR = 0.16 and p-value = 0.01), (OR = 0.40 and p-value = 0.05) and (OR = 0.78 and p-value = 0.04) respectively.

**Table 2** Bivariate analysis between some variables and children's development (CREDI).

Variables	Child's Development (CREDI)					
	Motor		Cognitive		Sosioemotional	
	Mean±SD	P Value	Mean±SD	P Value	Mean±SD	P Value
	Stimulation*					
Less	4.53±0.77	0.000	15.87±2.58	0.000	13.63±3.46	0.000
Enough	4.82±0.45		17.11±1.38		15.81±3.06	
HAZ*						
Stunted	4.65±0.70	0.016	16.36±2.15	0.122	14.66±3.68	0.005
Normal	4.74±0.56		16.77±1.97		15.09±3.17	
WAZ*						
Underweight	4.60±0.75	0.001	16.53±2.15	0.575	14.82±3.46	0.603
Normal	4.75±0.55		16.63±2.02		14.95±3.38	
WHZ*						
Wasted	4.55±0.77	0.016	16.48±2.00	0.799	14.40±4.08	0.038
Normal	4.72±0.59		16.61±2.01		14.98±3.28	
Birth Weight*						
LBW	4.66±0.61	0.750	15.86±3.39	0.002	14.00±3.54	0.980
Normal	4.70±0.62		16.63±1.98		14.95±3.39	
Birth Length*						
<48 cm	4.69±0.65	0.919	16.72±2.10	0.978	14.93±3.22	0.462
≥48 cm	4.70±0.62		16.56±2.05		14.90±3.45	
Breastfed*						
Non Exclusive	4.77±0.47	0.000	16.83±1.83	0.003	15.17±3.46	0.767
Exclusive	4.64±0.71		16.41±2.21		14.70±3.34	
Immunization*						
Not Complete	4.60±0.69	0.002	16.42±2.02	0.118	13.74±2.64	0.000
Complete	4.80±0.52		16.77±2.10		16.11±3.68	
Punishment*						
Yes	4.65±0.70	0.038	16.37±2.24	0.004	14.41±3.44	0.000
None	4.80±0.39		17.06±1.56		15.91±3.10	
Intervention						

PG	4.63±0.74		16.50±1.92		14.60±3.55	
EG	4.72±0.59	0.491	16.76±1.90	0.589	15.01±3.29	0.539
IG	4.74±0.52		16.54±2.32		15.10±3.35	

\* = Indicating is significant (p<0.05)

**Table 3** Multivariate analysis between some variables and children's development.

Variables	Child's Development														
	Motor				Cognitive				Socioemotional						
	P	V	OR	Lower	Upper	P	V	OR	Upper	Lower	P	V	OR	Lower	Upper
Stimulation*	0.001	0.23	0.09	0.37	0.000	1.05	0.49	0.61	0.000	1.65	0.94	0.98			
Punishment	0.634	0.03	0.08	0.11	0.292	0.25	0.73	1.22	0.117	0.95	0.13	0.15			
Immunization	0.244	0.08	0.06	0.23	0.352	0.20	0.21	0.83	0.000	2.09	0.77	1.42			
Stunted*	0.013	0.16	0.30	0.36	0.050	0.40	0.21	0.83	0.041	0.78	0.34	0.41			
Underweight	0.515	0.05	0.11	0.22	N/A	N/A	N/A	N/A	0.326	0.42	0.27	0.42			
Wasted	0.353	0.10	0.35	0.31	N/A	N/A	N/A	N/A	0.417	0.44	0.51	0.63			
Birthweight	N/A	N/A	N/A	N/A	0.110	0.83	0.18	0.19	N/A	N/A	N/A	N/A			
Breastfed	0.288	0.07	0.30	0.36	0.262	0.24	0.06	0.18	N/A	N/A	N/A	N/A			

*Analysis use dummy regression test*  
 \* = Indicating is significant (p<0.05)

#### IV. DISCUSSION

In this study, children's development was measured using the CREDI instrument which has 3 aspects, namely motor, cognitive, and socioemotional. Based on the results of the study, it shows that children's development is influenced by 2 important factors, namely the child's nutritional status (stunted) and stimulation by parents.

Firstly, children stunted will have a worse development rate than not stunted because children stunted are malnourished (insufficient food intake for a long time). During this time of deficiency, the growth of cells or tissue development which should increase over time but hampered due to inadequate nutrition. For example, the development of brain cells requires sufficient iodine, folic acid, iron, and zinc so that when any of these nutrients are not fulfilled, there will be an inhibitor or disturbance in the development of cell tissue to the brain. Likewise for bone growth that requires adequate calcium and muscle growth in children who need a balance of protein, fat, and carbohydrates. The results of this study are the same as research conducted in South Asian countries which saw how child development is affected by stunting and also the level of family income.<sup>7</sup> When there is an inhibition in brain tissue development, this will affect the level of intelligence (language) of the child, where the child normally can say words or sentences at the age of 1 year but the stunted child can not reach it.<sup>8</sup> In addition, this brain development also affects all other forms of child development, for example in the motoric aspect, will have an impact on the level of response to children's movements, and on the socioemotional aspect will have an impact on the child's response when they are sad or fussy. Inhibition of the child's muscle tissue will affect the activity of the child, walking and jumping or lifting objects around it.<sup>9</sup> So that when children stunted during the preschool period will have a failure in terms of learning because they tend to be inactive and slow to understand when given explained.<sup>10</sup>

Secondly, children who are not given good stimulation from their parents will also have an impact on children's development. The results of this study are the same as those obtained in previous studies in Tanzania for children aged 20-39 months.<sup>11</sup> This stimulation function is increasing children's development, namely in the cognitive aspect, so it is trained to mention and introduce children to the names of family members. Furthermore, in the motoric aspect, children should be taught to color, jump, run, and wear their clothes or shoes. Then in the socioemotional aspect, children are taught not to cry, fuss, or scream when they are upset. In this stimulation, parental assistance is needed in supporting children's development because family is the first community occupied by children before interacting with their peers when they enter the preschool period. This stimulation needs to be done continuously for the child to train the muscles to move and develop, train the child's thinking ability and the child's socio-emotional aspects. The existence of this stimulation will train the child to do good things and get

used to it to support the child's motor, cognitive, or socio-emotional development.<sup>12</sup> Even a healthy child without stimulation of good things by parents will result in slow development or development in bad things.<sup>13</sup> Good children's development will increase learning achievement when they enter the elementary school phase. Therefore, in increasing the child's development index, it is necessary to first improve the nutritional status of the child and be supported with appropriate and intensive stimulations by the parents.

This study recommends the importance of the role of parents in improving the development of children under 5 years of age. The role of parents in preventing stunting in children will have a positive impact on motor, cognitive and socio-emotional development. In addition, it is necessary to provide stimulation given to the mother during the period under 5 years so that it is more triggering for optimal child development. Stimulation will make children more active and able to more quickly receive advice from parents.

## V. CONCLUSION

Child development is influenced by 2 important factors, namely the child's nutritional status (stunting) and the role of parents in providing stimulation to improve children's development. It is suggested in future studies to assess the stimulation by parents of child development using a prospective cohort study design.

### Ethical Aspects

This article has received ethical approval from the Ethics Commission of the Faculty of Public Health, Hasanuddin University with Protocol Number: 5111993028 signed on letter number 10153 / UN4.14.7 / TP.01.02/2019. Information regarding the research objective was read to the participants, and verbal informed consent was received. The collection data in the field is started since December 11<sup>th</sup>, 2019 until 11<sup>th</sup> January, 2020.

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### Conflict of Interest

The authors declare no conflict of interest.

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