
Determinants of Growth of Preschool Children in Rural and Urban Areas North Central Timor District - East Nusa Tenggara Province - Indonesia

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Abstract

Background: The prevalence of children under five failing to thrive in North Central Timor 2019 is still high; underweight 27.54%, stunting 51.8% and wasting 4.81%. Stunting and underweight are highest in the preschool age group while wasting are lower in the higher age group. Family socio-economy, parenting patterns, consumption patterns and infectious diseases are risk factors for children's growth. **Objective:** To analyze the description of differences and determinants of growth in preschool children in rural and urban areas. **Methods:** Observational study with cross-sectional design. Multistage sampling technique with a number of 130 subjects in rural areas and 130 in urban areas. The Mann Whitney test identifies the difference in variables. Multiple logistic regression analysis to determine the determinants of growth.

Results: There were significant differences ($p = <0.05$) in the variables of maternal education, maternal occupation, family income, feeding practices, health hygiene practices, food frequency. There was no significant difference ($p > 0.05$) in family size, love and cares practice, academic practice, incidence of illness, frequency of illness and duration of illness.

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Determinants of growth in rural areas; health hygiene practice (p value = 0.011; OR = 3.177; 95%CI= 1,299-7,770), food frequency (p value = 0.025; OR = 2.522; 95%CI= 1,122-5,669) and frequency of illness (p value = 0.043, OR = 2.453; 95%CI= 1,029-5,846) while in urban areas; practice of love and cares (p value = 0.022, OR = 3,390; 95%CI= 1,192-9,639) and duration of illness (p value = 0.033, OR = 2.226; 95%CI= 1,068-4,640).

Conclusion: Health hygiene practice, food frequency and sickness frequency are determinants of growth in rural areas, while in urban areas are the practice of compassion and duration of illness. Efforts to overcome growth disorders can be done through increasing knowledge related to the practice of parenting.

Keywords: growth; preschool children; determining factors; parenting.

1. Introduction

Preschool age (3-6 years) is the golden age of growth and development of children [1]. In this age range, a child should grow normally to support optimal development when entering school age. But in fact, globally in 2017, the prevalence of stunting is 22.2%, wasting 7.5% and overweight is 5.6% [2]. In Indonesia 2018, the prevalence of underweight is 27.7%, stunting is 30.8%, wasting is 10.2% and overweight is 3.1%. East Nusa Tenggara Province is classified as a high category of nutritional problems, namely the prevalence of stunting is 42.7%, underweight is 29.5%, wasting is 12.8% and is overweight is 1.1% [3]. The results show that the prevalence of stunting and underweight is higher in the age group > 12 months and continues until the end of toddlerhood. Meanwhile, the prevalence of wasting has decreased in higher age groups [3][4]. Kusumaningrim's research shows children under five who are aged 36-59 months have a risk of stunting by 0.292 times higher than children under five aged 12-35 months [5]. Wasting and stunting are associated with increased mortality, especially when both forms of malnutrition occur in the same child. Children who are moderately or severely wasted have a higher risk of death [2]. . Malnutrition in children under five has an impact on irreversible development and growth, including being a short adult, low school achievement, and low productivity as an adult [6]. The socio-economic family, namely education, work, number of family members and family income are risk factors for growth in children [7]. Rural and urban areas have their peculiarities, both the availability of educational facilities, health services, and diversity of food will have different impacts on children's growth. The results of Nutritional Status Monitoring in North Central Timor Regency of 13,648 children under five years of age showed that the prevalence of underweighing children under five was 27.54%, stunting 51.8% and wasting 4.81% [8]. Observing the conditions mentioned above, if the condition of malnutrition is not handled quickly and precisely, it will result in loss generation and will become a burden to the country in the future. This study aims to analyze the differences and determinants of the growth of preschool children in rural and urban areas. The results of this study can be used as a source of great information and the extent of the problems and factors causing malnutrition in Timor Tengah Utara District.

2. Method

This research is an analytic observational study with cross sectional design. Research in North Central Timor Distric in March - April 2020. With a sample size formula of two cross-sectional study populations, with $\alpha = 5\%$, $\beta = 10\%$, $P1 = 0.502$, $P2 = 0.375$ obtained a sample size of 247 children. In order to anticipate a reduction

in the sample with a proportion of 5%, a sample size of 260 children was obtained [9]. So that the number of samples in rural areas is 130 people and urban areas are 130 people. The sampling technique was carried out in a multistage manner. Purposive sampling to classify categories of rural and urban areas refers to the Regulation of the Head of the Central Statistics Agency concerning the Classification of Urban and Rural Areas in Indonesia [10]. Furthermore, with the random sampling technique, Kefamenanu City District as the primary sampling unit (PSU) for urban areas and Musi District as rural areas. Next, do a cluster sampling of villages / wards at each PSU based on the size of the child population of 36-59 months and 4 (four) villages were selected in rural areas and 2 (two) sub-district in urban areas to meet the sample size. Primary data includes weight data measured using Dacin capacity of 25 kg and height using a microtoice. Family size, family income, mother's education, parenting style, disease status using a questionnaire. Food frequency and food groups used a food frequency questionnaire (FFQ). Secondary data were obtained by the Central Statistics Agency, District Health Office, Sasi Health Center and Oeolo Health Center. Family characteristics including maternal education are categorized as High if $\geq$ senior high school and low if $\leq$ junior high school. Mother's job is classified as working and not working. Income is grouped according to the provincial minimum wage standard for the Province of East Nusa Tenggara 2020, both $\geq$ IDR 1,950,000 and less than IDR 1,950,000. The number of large family members ≥ 5 people and small < 5 people. Scoring is used to classify feeding practices, hygiene and health practices, love and care practices and academic practices measured using a Likert scale in the category of Good if $\geq 80\%$ and less if $< 80\%$. The frequency of eating is good if $\geq$ mean and less if $<$ mean. Consumption of the food group, including staple foodstuffs, fats / oils, animal protein, vegetable protein, vegetables and fruit, is categorized as Good if > 4 groups and less if < 4 groups. The incidence of illness was categorized as present or not, the frequency of illness was categorized as frequent (> 1 time) and rare (≤ 1 time) and the duration of illness was categorized as long (> 3 days) and short (≤ 3 days). Assessment of growth status based on the index WAZ, HAZ and WHZ. Children are categorized as normal if they do not experience any form of malnutrition (WAZ: -2 Z score to $+2$ Z score; HAZ: -2 Z score to $+3$ Z score and WHZ: -2 z score s / d $+1$ z score) and it is not normal if the child experiences one form of malnutrition, if WAZ: < -2 z score and $> +2$ z score, HAZ: < -2 z score and $> +3$ z score and WHZ : < -2 z score and $> +1$ z score [11]. Multiple Logistic Regression statistical test 95% CI was used for the analysis of growth determinants. Bivariate analysis was performed to select candidates who met the requirements of p-value < 0.25 or were substantially eligible for inclusion in multiple logistic regression analysis. Mann Whitney test to analyze differences in determinants of growth in rural and urban areas [12].

3. Result and Discussion

3.1 Comparative analysis of research variables

a. Family Characteristics

53.8% of mothers completed formal secondary and tertiary education, the highest percentage in urban areas was 71.5%. Mother does not work at 75.0%, the highest percentage is in rural areas, namely 86.9%. As much as 56.2% are small families, there is no difference in the percentage of families in rural and urban areas. Only a third of family families, namely 36.2% have an expenditure of more than the UMR Rp. 1,950,000, -, the highest in urban areas is 43.1%. The results of the Mann Whitney test analysis showed that there were significant

differences in family characteristics including the level of mother's education (p value = 0,000), maternal occupation (p value = 0,000) and income (p value = 0.020) in rural and urban areas, while family size had no significant differences. (p value = 1,000).

b. Parenting Practices

Table 1 shows that the good category of feeding practice is only 28.8%, the highest in urban areas is 35.4%. Good health hygiene practice category 28.5%, the highest in urban areas 35.4%. In the category of good compassionate practice 15.4%, there does not appear to be a big difference between urban and rural areas. The category of good academic practice is 22.3%, the highest is in urban areas, namely 26.9%. The results of the Mann Whitney test show that there are significant differences in feeding practices (p -value = 0.020) and health hygiene practices (p -value = 0.014) in rural and urban areas, while the practice of compassion (p -value = 0.732) and academics has no significant difference (p -value = 0.074).

Table 1: Distribution of subjects according to parenting patterns in rural and urban areas

Parenting Patterns	Region Category				Total	
	Rural areas		Urban areas		n=260	%
	n= 130	%	n= 130	%		
Feeding Practices						
Poorly	101	77,7	84	64,6	185	71,2
Good	29	22,3	46	35,4	75	28,8
<i>Mann Whitney test</i>						
<i>P-value</i>	0,020					
Health Hygiene Practice						
Poorly	102	78,5	84	64,6	186	71,5
Good	28	21,5	46	35,4	74	28,5
<i>Mann Whitney test</i>						
<i>P-value</i>	0,014					
Love practice						
Poorly	111	85,4	109	83,8	220	84,6
Good	19	14,6	21	16,2	40	15,4
<i>Mann Whitney test</i>						
<i>P-value</i>	0,732					
Academic practice						
Poorly	107	82,3	95	73,1	202	77,7
Good	23	17,7	35	26,9	58	22,3
<i>Mann Whitney test</i>						
<i>P- value</i>	0,074					

c. Food Consumption Pattern

The description of the pattern of food consumption as in table 4 shows that 56.2% of the frequency of food is in a low category, the highest in rural areas is 63.1%. Meanwhile, based on the foodstuff group, only 33.1% were in a good category, the highest was in the city at 38.5%. The results of the Mann Whitney test showed a significant difference in the frequency of food consumption (p -value = 0.025), while there was no significant difference in the food group (p -value = 0.065).

Table 2: Distribution of subjects according to the pattern of food consumption for preschool children in rural and urban areas

Food Pattern	Region Category				Total	
	Rural areas		Urban areas		n=260	%
	n= 130	%	n= 130	%		
Food Frequency						
Poorly	82	63,1	64	49,2	146	56,2
Good	48	36,9	66	50,8	114	43,8
<i>Mann Whitney test</i>						
<i>P –value</i>	0,025					
Food Group						
Poorly	94	72,3	80	61,5	174	66,9
Good	36	27,3	50	38,5	86	33,1
<i>Mann Whitney test</i>						
<i>P-value</i>	0,065					

d. Infectious Diseases**Table 3:** Distribution of Subjects according to Consumption Patterns and Preschool Child Infectious Diseases

Infectious Diseases	Region Category				Total	
	Urban areas		Rural areas		n=260	%
	n= 130	%	n= 130	%		
Incidence of illness						
No incident	40	30,8	55	42,3	95	36,5
There was an incident	90	69,2	75	57,7	165	63,5
<i>Mann Whitney test</i>						
<i>P value</i>	0,054					
Frequency of illness						
Rarely	79	60,8	87	66,9	166	63,8
Often	51	39,2	43	33,1	94	36,2
<i>Mann Whitney test</i>						
<i>P value</i>	0,303					
Duration of illness						
Short	61	46,9	76	58,5	137	52,7
Long	69	53,1	54	41,5	123	47,3
<i>Mann Whitney test</i>						
<i>P value</i>	0,063					

Table 5 illustrates that in the last 3 (three) months, 63.5% of children experienced illness, 36.2% were often sick and 47.3% had a long-term illness. Descriptively preschool children in rural areas contributed more in terms of number, frequency and duration or duration of illness. Mann Whitney test analysis showed that there was no significant difference in the incidence of illness (p-value = 0.054), frequency of illness (p-value = 0.303) and duration of illness (p-value = 0.063) in the two areas of residence.

e. *Preschool Child Growth*

As many as 59.2% of preschool children aged 36-59 months have a form of growth problem where the prevalence in rural areas is higher, namely 67.7% compared to urban areas, namely 50.8%. Meanwhile, the prevalence of growth problems for underweight children (< -2 z score) was 33.8.8%, stunting (-2 z score) was 48.5%, and malnutrition (< -2 z score) was 14.6%. The prevalence of low and short weight children is higher in rural areas, while the highest prevalence of malnutrition is in urban areas. Compared to research in 2011, the prevalence of underweight is 39.3%, 54% short and 9.5% thin, this shows that there is a decrease in the prevalence of low and short weight while the prevalence of underweight children increases [14].

3.2 *Analysis of Determinants of Growth*

The variables in rural areas that met the requirements ($p\text{-value} > 0,25$) were maternal education, working mothers, feeding practices, hygiene and health practices, academic practices, food frequency and sickness frequency. Meanwhile, in urban areas, the variables that meet the requirements include working mothers, health hygiene practices, love and cares practices, food frequency, illness incidence and duration of illness.

Table 4: The result of multiple logistic regression analysis determines the growth status of preschool children in rural and urban areas

Region Category	Variable	B	p value	OR	CI 95%
Rural areas	- Hygiene and health practices	1,156	0,011	3,177	1,299-7,770
	- Frequency of food	0,925	0,025	2,522	1,122-5,669
	- Frequency of illness	0,897	0,043	2,453	1,029-5,846
	Constant	-1,988			
Urban areas	- Love practice	1,221	0,022	3,390	1,192-9,639
	- Duration of illness	0,800	0,033	2,226	1,068-4,640
	Constant	-0,690			

Based on the results of the multivariate analysis as in table 4, health hygiene practices, food frequency and frequency of illness are determinants of growth in rural areas while in urban areas are the love practice and duration of illness. The logistic regression model in rural areas is $\text{Ln } P / 1-P = -1.988 + 0.897$ (frequency of illness) + 0.925 (frequency of food) + 1.156 (health hygiene practice). While in urban areas is $\text{Ln } P / 1-P = -0.690 + 0.800$ (duration of illness) + 1.221 (love practice).

a. *Hygiene Practices for Health and Growth of Preschool Children*

In table 4, it shows that health hygiene practices are a determining factor for growth in rural and urban areas. If the other variables are constant; In rural areas, the probability of children growing abnormally was 3.2 greater than children with good health hygiene practices, while in urban areas it was 1.148 times greater than children with good hygiene and health practices. So it can be concluded that low health hygiene practices are more at risk of causing growth problems for children in rural areas than children in cities. In line with this study, Khariyah and his colleagues in Indonesia stated that the practice of washing hands with soap, brushing teeth, cleaning toys, storing food, washing hands, cutting nails and how to clean hands, has a significant relationship with the

incidence of stunting ($p < 0.05$ and $OR = 27,282$). Rah and his colleagues in their study in India that household access to toilet facilities was associated with a 16–39% reduction in the likelihood of stunting among children aged 0–23 months ($OR = 0.84$, 95% CI : 0.71 -0.99). The mother's or caregiver's practice of washing hands with soap either before eating or after defecating was associated with a 15% reduced risk of stunting ($OR = 0.85$; 95% CI : 0.76-0.94). Ngure and his colleagues revealed that children who live in an unhealthy and unhygienic environment are likely to be malnourished even though they don't have diarrhea or worm infections. A child may develop environmental enteropathy as a result of repeated exposure to leaky mucosal *Escherichia coli*, poor villi function and swelling of intestinal cells. This condition results in decreased digestion and absorption of nutrients, causing the child to fail to grow. Parasites, viruses and bacteria are naturally everywhere. Good health hygiene and environmental sanitation practices are protective against the incidence of illness in children. Poor practice increases the risk of infectious diseases in children such as diarrhea, acute respiratory infections (ARI) and intestinal worms. Recurrent and chronic illness results in the child failing to thrive.

b. Eating Frequency and Growth of Preschool Children

The frequency of food is a determining factor for growth in rural areas. If other variables are constant, the probability of children growing abnormally is 2.522 times greater than children with good food-frequency. This study is in line with Aramico and his colleagues in Indonesia, which shows that one of the determinants of stunting status is diet ($p < 0.001$; $OR = 6.22$). Assessment of eating patterns using an instrument food frequency questionnaire (FFQ) shows that a low food frequency score affects low nutrient intake[17]. The results of this study are the same as Murungi's study, which states that there is a significant relationship between the frequency of food consumed daily and the attendance rate of preschool children in Kenya. The presence of a child at school reflects the child's health condition. This makes it possible that the more frequently the food is consumed, the more likely it is that nutritional needs will be met [18]. Deslegn and his colleagues in Ethiopia stated that the decreasing consumption of animal source foods (meat) for children in Orthodox Christian families during the fasting period, children at risk are 1.8 times more likely to be stunted ($OR = 1.83$) and 6.8 times more at risk wasting compared to not fasting. This is because families object to preparing children's food sourced from animal food (meat). After all, they are worried that it will contaminate the family's food [19]. The results of a different study by Margawati suggest that there is no significant relationship between diet and z score of HAZ in children with stunting and WHZ with wasting ($p = 0.377$). It was explained that 88.9% of the subjects had excess energy consumption and 86.1% had excess protein consumption [20]. The frequency of food can describe the existing diet in a region. This is influenced by habits, enjoyment, culture, religion, economic level, natural environment, and so on. Food frequency describes the frequency of consumption of certain types of food in one month. A high consumption score indicates the frequency of consumption of this type of food. A high score is assumed to increase the frequency of food consumption, so the more likely it is that nutritional needs are met.

c. Infectious Diseases and Child Growth

Infectious disease is a determining factor for growth. The frequency of illness is a determining factor for growth in rural areas while the duration of illness in urban areas. In rural areas, if the other variables are constant, there

is a 2,453 times greater chance of growing abnormally than children who rarely get sick. Meanwhile, in urban areas, if the variable of the practice of affection is constant, the risk of growing abnormally is 2.226 greater than that of children whose duration of illness is shorter. The results of the same study revealed by Rahayu and his colleagues in Indonesia stated that a history of acute respiratory infections disease and diarrhea were the determining factors for wasting in children 12-48 months [21]. Sholikah's in Indonesia research shows that a history of the infectious disease affects the incidence of stunting in rural and urban areas [22]. Akram and his colleagues disclosed the same thing, namely that there was a significant relationship between children suffering from diarrhea and the incidence of wasting, both in rural and urban areas [23]. Research by Wurisastuti in East Nusa Tenggara Province, Indonesia, states that children who have a history of malaria are at risk of stunting than those without a history of malaria [24]. Infectious diseases and malnutrition are often found together and their relationship is interplay. Infection can reduce food intake, interfere with the absorption of nutrients, cause loss of nutrients directly due to vomiting or diarrhea and affect metabolism. This situation is the cause of failure to thrive in children. Malnourished children have low immune system, often get sick and will become increasingly malnourished, thus reducing their capacity to fight disease, in other words, malnourished children have longer duration of illness.

d. *Love and cares Practices and Child Growth*

The practice of love and cares is a determining factor for the growth of preschool children in urban areas. If the variable duration of illness is constant, the probability of children growing abnormally due to lack of love is 3,390 greater than children with good compassion practices. Similar results in the research of Cahyono and his colleagues in various di Kupang ecosystem zones, which stated that the practice of compassion is a determinant factor of stunting in the moderate plateau ecosystem zone ($p = 0.002$; $OR = 9.247$; $95\% CI: 2,213-38,644$). Parental warmth and positive supervision contribute to children's development in reducing negative emotional reactions and increasing positive emotional reactions and self-regulation [25]. Harpam and his colleagues concluded the association between high maternal mental disorders (CMD) and poor nutritional status of children in India and Vietnam ($aOR = 1.4$; $95\% CI 1.2-1.6$; $aOR = 1.3$, respectively. ; $95\% CI 0.9 -1.7$). This illustrates that depression and anxiety in mothers affect the quality of mothers in caring for children [26]. The child's need for affection is one of the basic needs needed to grow normally. Parental love provides guidance, protection, a feeling of security, comfort, feeling valued as an independent person and a sense of belonging. This situation will form a strong physical and psychological bond between parents and children so that it has a positive impact on children's growth and development [27].

4. Conclusion

The determinants of the growth of preschool children in rural areas are health hygiene practices, frequency of eating and frequency of illness, while in urban areas are practices of love and length of illness. There are significant differences in maternal education, maternal occupation, income, feeding practices, health hygiene practices, food frequency in rural and urban areas. Comprehensive and intensive intervention for families that involves all stakeholders is needed in dealing with malnutrition in children. The massive increase in public knowledge regarding the practice of compassion, nurture and compassion. Overcoming basic problems in the

family including improving family income will lead to improving food consumption patterns and children's health status.

5. Recommendation

Comprehensive interventions are needed to improve parenting practices including feeding practices, hygiene sanitation practices, love and cares practice and academic practices so that children grow and develop to reach their optimal potential. Families need to prioritize children in meeting nutritional needs by improving consumption patterns including food frequency and food groups. Other than that, families are expected to be able to take advantage of existing health services to prevent recurring and non-prolonged illness.

6. Research limitation

This study has limitations, including using a questionnaire that requires honesty and relying on the memory of respondents, does not calculate the level of nutrient consumption, does not make observation of environment sanitation and actual practice of parenting.

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