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Determinants of Stunting Events in Children Aged 6-23 Months in Locus and Non-Locus Areas in East Luwu Regency

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Abstract

Nationally, the prevalence of stunting in children under five in Indonesia is 30.8%. The incidence of stunting varies from region to region. This study aims to determine the determinants of stunting in children aged 6-23 months in the locus and non-loci in East Luwu Regency. This research is an observational analytic study using a cross sectional design. The study population was 858 children aged 6-23 months in five locus villages and five non-locus villages. sample of 200 people was taken using purposive sampling method, data were analyzed using the chi square test and logistic regression using the SPSS application. The results showed the similarity in terms of parental education in both regions. In general, the father has a job and the mother is a housekeeper. Income levels are higher in locus areas. As much as 43.1% of baduta had stunting at locus area and 22.4% at non locus. The logistic regression test showed that the factors associated with stunting in the locus were family members smoking (p = 0.032), hand washing practices (p = 0.036) and exclusive breastfeeding (p = 0.001). Meanwhile, non-locus areas were a history of diarrhea disease (p = 0.049) and hand washing practices (p = 0.052). Combined analysis of locus and non-loci showed that family members smoking (p = 0.005), exclusive breastfeeding (p = 0.001), frequency of complementary feeding (p = 0.027) and hand washing practices (p = 0.001) were determinants of stunting. The most dominant variable in the locus was exclusive breastfeeding, while non-locus was a history of diarrhea. Conclusion: The determinants of locus stunting are family members smoking, hand washing practices and exclusive breastfeeding. Meanwhile, non-locus areas are a history of diarrhea disease and hand washing practices.

Introduction

Stunting is a condition of failure to thrive in children under five due to chronic malnutrition and recurrent infections, especially in the first 1,000 days of life (HPK). Children are classified as stunting if their body length or height is below minus two standard deviations of the length or height of their age (Ministry of National Development Planning / Bappenas, 2018). Stunting and other malnutrition not only cause physical growth retardation and increase susceptibility to disease, but also threaten cognitive development which will affect the current level of

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intelligence and productivity of children in adulthood (Directorate General of Public Health, 2018).

The results of Basic Health Research (Basic Health Research, 2018a) show a decrease in the prevalence of stunting at the national level by 6.4% over a five-year period, from 37.2% (2013) to 30.8% (2018). The prevalence of stunting in South Sulawesi among under-five children (0-23 months) decreased by around 4.95% from 26.75% in 2016 to 21.8% in 2018 (Ministry of Health, 2017).

Several studies have shown mixed results regarding the factors associated with the incidence of stunting in Indonesia. Research conducted in East Kalimantan shows that the dominant factor associated with stunting in children under five is the mother's height (Chifdillah et al., 2019). Other research related to breastfeeding states that there is a relationship between breastfeeding and the incidence of body weight in children aged 0-24 months (Basri & Hadju, 2020). Hadju & Maddeppungeng's research (2020) found that birth length was significantly associated with stunting.

Research conducted in Indonesia shows that children who are not fed according to age are significantly more likely to be stunted (Torlesse et al., 2016). Giving complementary foods to children is needed to improve the nutritional status of children aged 6-24 months because stunting is a chronic nutritional problem that is not directly seen in children's height growth but takes a long time (Stewart et al., 2013). Children with diarrhea morbidity are predictors of stunting (Dake et al., 2019). Research in Ethiopia shows that BMI is a predictor of stunting (Batiro et al., 2017).

Nutritional status monitoring data based on the results of the e-PPGBM (Community-Based Nutrition Recording and Reporting) survey in 2019 shows that the prevalence of stunting in East Luwu district is 8.2%. The highest prevalence of stunting was found in Wasuponda Subdistrict at 21.4%, Towuti Subdistrict 11.4% and Malili Subdistrict at 8.7%. Although the prevalence of stunting in East Luwu Regency is low, there are still cases of stunting, so it is important to be aware of the determinants of stunting incidence in children aged 6-23 months in locus and non-locus areas so that the intervention will be right on target.

Methods

This type of research is observational using a cross sectional study design. The research was conducted in ten (10) villages, namely five villages with stunting loci and five non-stunting locus villages in East Luwu Regency. The population in this study were all children aged 6-23 months in five locus villages and five non-stunting locus villages. A sample of 200 baduta was selected by purposive sampling that met the inclusion criteria and obtained a sample of 102 people in the locus area and 98 people in the non-locus area.

Data collection was carried out by researchers and assisted by experienced enumerators in taking anthropometric measurements and conducting interviews using questionnaires and data on baduta food consumption (consumption recall 1x24 hours). The data analysis used the SPSS program, the determination of the Z-Score TB/U-value using the WHO-Anthro 2005 software and the food consumption data was calculated using Nutrisurvey 2007. The data in this study used bivariate analysis using the chi-square test. Multivariate analysis was conducted to determine which independent variables tended to be more influential by using the binary logistic test.

Results and Discussion

This research was conducted in the locus village, which is a village with a high prevalence of stunting and non-locus, namely a village with a low stunting prevalence. There are differences

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in the characteristics of the two regions, especially in terms of family income and nutritional status. Apart from differences, similarities were also found in the two regions, such as the number of family members, the education of the father and mother, the occupation of the father and the mother, the age of the child and the sex.

Table 1 below shows that there are differences in nutritional status between locus and non-locus areas. From the data, it can be seen that baduta stunted more in the locus (43.1%) than in non-locus (22.4%). Meanwhile, the age and sex of children did not show any differences in the two regions. There were more children aged 6-11 months both in the locus (44.1%) and non-locus (41.8%) compared to those above 12-17 months and 18-23 months in both areas. Likewise with the gender of children, more men (53.9% and 51.0%) were found than women in the two regions.

Table 1. Frequency Distribution of Child Characteristics Locus and Non Locus Areas

Children Characteristics	Locus (102)		Non Locus (98)		P-Value
	n	%	n	%	
Nutritional status					
Stunting	44	43.1	22	22.4	**0.002**
Normal	58	56.9	76	77.6	
Children's Age					
6-11 Months	45	44.1	41	41.8	0.595
12-17 Months	33	32.4	38	38.8	
18-23 Months	24	23.5	19	19.4	
Children's Sex					
Male	55	53.9	50	51	0.681
Female	47	46.1	48	49	

Source: Primary Data Analysis, 2020

Table 2 shows that there is no difference between locus and non-locus areas in terms of number of family members (P = 0.125), father's education (P = 0.821), maternal education (P = 0.603), father's occupation (P = 0.977) and maternal occupation. (P = 0.181). The number of family members (≥5 people) was 60.8% more in the locus area. Meanwhile, non-locus areas have the same number of family members. The education of both father and mother is high. In general, parents, especially fathers, have jobs. Meanwhile, more mothers do not work. As for family income, differences were found in the two regions. Where, high family income is more locus area (52%) while non locus more low income (70.4%).

Table 2. Frequency Distribution of Family Characteristics in Locus and Non-Locus Areas

Respondent Characteristics	Locus (102)		Non Locus (98)		P-Value
	n	%	n	%	
Number of Family Members					
Few (<5 people)	40	39.2	49	50	0.125
Many (≥ 5 people)	62	60.8	49	50	
Father's Education					
Low (<SMA)	39	38.2	39	39.8	0.821
High (≥ SMA)	63	61.8	59	60.2	
Mother's Education					
Low (<SMA)	39	38.2	41	41.8	0.603
High (≥ SMA)	63	61.8	57	58.2	
Father's occupation					0.977

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Work	101	99.0	97	99.0	
Does not work	1	1.0	1	1.0	
Mother's work					
Work	11	10.8	17	17.3	0.181
Does not work	91	89.2	81	82.7	
Family Income					
Low (<3 m)	49	48	69	70.4	**0.001**
High (≥ 3 m)	53	52	29	29.6	

Source: Primary Data Analysis, 2020

Bivariate Analysis

The relationship between mother and household factors with the incidence of stunting in table 4 below shows that of the four variables studied, only family members who smoke h a significant relationship with stunting in the locus area (p = 0.025) and in non-locus areas there was no significant re tionship. (p = 0.756). Meanwhile, maternal height, mother's education, and birth weight did not have a significant relationship with the incidence of stunting with p-values of p = 0.680, p = 0.371, p = 0.728 in the locus and non-locus areas respectively p = 0.756. , p = 0.555.

Table 4. Relationship between Mother and Household Factors and Stunting in Locus and Non Locus Areas

Variable	Locus					Non Locus				
	Stunting (n=44)		Normal (n=58)		P-value	Stunting (22)		Normal (76)		P-value
	n	%	n	%		n	%	n	%	
Mother's Height										
High risk (<150 cm)	9	47.4	10	52.6	0.680	3	16.7	15	83.3	0.756
Low risk (≥ 150 cm)	35	42.2	48	57.8		19	23.7	61	76.3	
Mother's Education										
Low (<SMA)	19	48.7	20	51.3	0.371	8	19.5	33	80.5	0.555
High (≥ SMA)	25	39.7	38	60.3		14	24.6	43	75.4	
Family Members Smoking										
High risk (smoking)	31	52.5	28	47.5	**0.025**	18	28.6	45	71.4	0.051
Low risk (no smoking)	13	30.2	30	69.8		4	11.4	31	88.6	
Child Birth Weight										
High risk (<2500 grams)	3	33.3	6	66.7	0.728	0	0	0	0	
Low risk (≥ 2500 grams)	41	44.1	52	55.9		22	22.4	76	77.6	

Source: Primary Data Analysis, 2020

The relationship between history of breastfeeding and stunti in the locus and non-loci can be seen in Table 5 which shows that exclusive breastfeeding has a significant relationship with stunting at the locus (p = 0.001). However, it was not significant in the non-locus area p = (0.673). In the locus of children who were not exclusively breastfed and stunted more (64.9%) than those who were exclusively breastfed (30.8%), while in non-locus areas, children who were exclusively breastfed and stunted were less (25%) than those who were not exclusively breastfed (21.2%).

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Table 5. Relationship history of breastfeeding with locus and non-locus stunting

Variabel	Locus					Non Locus				
	Stunting (n=44)		Normal (n=58)		P-value	Stunting (22)		Normal (76)		P-value
	n	%	n	%		n	%	n	%	
Status IMD										
High risk (not IMD)	3	30	7	70	0.508	4	19	17	81	0.776
Low risk (IMD)	41	44.5	51	55.5		18	23.4	59	76.6	
Giving Colostrum										
Not getting colostrum	2	25	6	75	0.461	3	16.7	15	83.3	0.756
Got colostrum	42	44.7	52	55.3		19	23.7	61	76.3	
Exclusive Breastfeeding										
High risk (not exclusive breastfeeding)	24	64.9	13	35.1	**0.001**	8	25	24	75	0.673
Low risk (exclusive breastfeeding)	20	30.8	45	69.2		14	21.2	52	78.8	

Source: Primary Data Analysis, 2020

The relationship between the history of complementary breastfeeding with stunting in the locus and non-loci in table 6 below explains that the frequency of complementary feeding in the locus and non-locus areas did not have a significant relationship with the incidence of stunting with p = 0.814 locus and p = 0.159 non-locus areas. The frequency of giving complementary breastfeeding that was suitable but stunted was 42.7% in the locus area and 28.9% non-locus. In the locus, the energy intake was lacking and stunting was 45.9%, while in non-locus areas it was 25%.

Table 6. Relationship of complementary feeding history (MP ASI) with locus and non-locus stunting

Variable	Locus					Non Locus				
	Stunting (n=44)		Normal (n=58)		P-value	Stunting (22)		Normal (76)		P-value
	n	%	n	%		n	%	n	%	
Frequency of giving complementary foods										
High risk (Not suitable)	6	46.2	7	53.8	0.814	9	17	44	83	0.159
Low risk (Appropriate)	38	42.7	51	57.3		13	28.9	32	71.1	
Energy intake										
Less (<80%)	28	45.9	33	54.1	0.492	17	25	51	75	0.362
Enough (80-110%)	16	39	25	61		5	16.7	25	83.3	

Source: Primary Data Analysis, 2020

The relationship between infectious disease history and stunting in the locus and non-locus areas can be seen in Table 7. The analysis showed that a history of diarrheal disease showed a significant relationship with stunting in non-locus areas with p value = 0.021. Whereas in the locus area, the history of diarrheal disease did not show a significant relationship with stunting (p = 1,000). In non-locus areas, children without diarrhea but stunting were 43.6% more in the locus area than in non-locus areas (17.3%). Meanwhile, children with diarrhea and stunting were more in the non-locus area, 47.1% than in the locus 37.5%.

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Hand washing practice showed no association with stunting in the locus area (p = 0.086), but was significantly associated with non-locus area (p = 0.018). Stunting was more common in mothers who did not/occasionally wash their hands at the locus (50.9%) than in non-loci (34.1%). Likewise with mothers who always wash their hands but stunting more in the locus area (34%) than non-locus (14%).

Table 7. Relationship history of infectious disease with locus and non-locus stunting

Variable	Locus					Non Locus				
	Stunting (n=44)		Normal (n=58)		P-value	Stunting (22)		Normal (76)		P-value
	n	%	n	%		n	%	n	%	
History of Diarrhea										
High risk (diarrhea)	3	37.5	5	62.5	1.000	8	47.1	9	52.9	**0.021**
Low risk (No diarrhea)	41	43.6	53	56.4		14	17.3	67	82.7	
Practice Hand Washing										
No / sometimes	28	50.9	27	49.1	0.086	14	34.1	27	65.9	**0.018**
Always	16	34	31	66		8	14	49	86	

Source: Primary Data Analysis, 2020

Multivariate Analysis

The results of logistic regression analysis in table 8 show that family members smoking (p = 0.032), hand washing practices (p = 0.032) and exclusive breastfeeding (p = 0.01) have a p value <0.05, which means that family members who are smoking, hand washing practices and exclusive breastfeeding are factors that influence the incidence of stunting in the locus area. The most dominant variable as a determinant factor was exclusive breastfeeding (p = 0.01). Meanwhile, non-locus areas indicated that a history of diarrhea disease (p = 0.049) and hand washing practices (p = 0.052) had the potential to influence the incidence of stunting. The p value of the hand washing practice variable includes a borderline value, which means that these two variables can affect the incidence of stunting. The most dominant variable as a determinant factor was a history of diarrhea (p = 0.049).

Furthermore, a multivariate analysis was carried out by combining locus and non-locus area variables that were eligible for analysis to see if there were different results after separate analyzes. The results of the analysis show that there are four variables that have the potential to influence the incidence of stunting in the locus and non-locus areas, namely smoking family members (0.005), exclusive breastfeeding (0.001), frequency of complementary feeding (0.027), and hand washing practices (0.001). The most dominant variables as determinants of stunting were exclusive breastfeeding and hand washing practices (p = 0.001).

Table 8 Results of Independent Variable Logistic Regression Analysis on Stunting Incidence of Locus, Non Locus and Combined Locus and Non Locus Areas

Variable	Sig.	Exp(B)
Locus Area: Family Members Smoking	**0.032**	2.681
Practice Hand Washing	**0.036**	0.378
Exclusive Breastfeeding	**0.001**	0.203
Non Locus Area:		
Family Members Smoking	0.101	2.768

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History of Diarrhea	**0.049**	0.304
Practice Hand Washing	**0.052**	0.358
Combined Locus and Non Locus:		
Family Members Smoking	**0.005**	2.736
Exclusive breastfeeding	**0.001**	0.332
MP ASI frequency History of Diarrhea Practice Hand Washing	**0.027** 0.694 **0.001**	2.295 0.825 0.332

Source: Primary Data Analysis, 2020

In this study, it was found that the prevalence of stunting was higher in the locus area (43.1%) than in non-locus areas (22.4%). The prevalence rate of locus area exceeds the national prevalence of baduta stunting which is 29.9% and South Sulawesi province is 33.9%, while non-locus prevalence is below the national prevalence and province of South Sulawesi The high prevalence of stunting in the locus area is normal because this research area is a rural area in East Luwu Regency. Nationally, the prevalence of baduta stunting is indeed higher in rural areas (32.8%) than in urban areas (27.4%) (Basic Health Research, 2018b).

The results of multivariate analysis showed that the determinants of stunting in the locus were family members smoking, exclusive breastfeeding and hand washing practices. Meanwhile, in non-locus areas, there is a history of diarrhea and hand washing practices. Furthermore, the combined analysis showed consistent results, namely smoking family members, hand washing practices and the frequency of giving complementary and exclusive breastfeeding.

The results showed that smoking was found as a determinant factor for stunting at the locus in this study (p = 0.032). In line with research in Nepal, it also shows that the prevalence of stunting is higher in mothers who have a smoking habit (Sutér et al., 2017). There are 28.3% children who are underweight in homes where the father does not smoke, and 35.6% in households where the father smokes (Wijaya-Erhardt, 2019).

From the results of observations made in the field, the fact is that smoking is dominated by male parents (fathers). This is because most of the fathers act as breadwinners. It is very difficult for them to get rid of the habit of smoking because cigarettes are used as an excuse to relieve sleepiness, considering that the locus area is one of the empowerment areas for mining companies where most of the employees work ship-ship, especially those who work at night. The same reasons were stated by those who work as farmers in the fields or in the garden. Automatically it can also be seen that cigarettes divert the need for food shopping in the household. There tends to be less family food needs so that the fulfillment of family nutrition is also less, especially for families with low economic income. This condition will increase the risk of children with malnutrition.

The habit of washing hands with water and soap can more effectively remove dirt and dust from the surface of the skin and significantly reduce the number of disease-causing microorganisms such as viruses, bacteria and parasites (Rahmawati & Proverawati, 2012). The results showed that the practice of hand washing was a determinant factor for the incidence of stunting in the locus and non-locus areas.

The data show that stunting is higher in mothers who do not/occasionally wash their hands in the locus and non-locus areas than in mothers who always wash their hands. According to information obtained in the field, some mothers actually get used to washing their hands but rarely use soap and running water and some even limit their use of water. This possibility is

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one of the contributing factors because of the improper way of washing hands so that dirt still sticks to the hands when the mother prepares food for her child.

The results showed that there was a relationship between exclusive breastfeeding and the incidence of stunting in the locus (p = 0.003). This result is in line with research in Central Java which shows that children aged 6-24 months who are not exclusively breastfed have a risk of stunting 1,282 times compared to children who are exclusively breastfed (Nugraheni et al., 2020). The same thing was also stated by Uwiringiyimana et al (2019) that children with a history of exclusive breastfeeding are less likely to experience stunting because children get all the important nutrients that are useful in children's development in the first 6 months of life that can prevent stunting. There is a relationship between the incidence of malnutrition and breastfeeding (Basri & Hadju, 2020). The same thing was stated by (García Cruz et al., 2017; Akombi et al., 2017).

The content of breast milk which is rich in nutrients can reduce the risk of the baby developing infectious diseases which can increase malnutrition and if occurs in the long term it can interfere with nutrient absorption, thereby increasing the risk of stunting in children under five. The effect of exclusive breastfeeding on changes in stunting status is due to the function of breastfeeding as an anti-infection. Based on interviews with sample mothers of children under five who do not exclusively breastfeed, most mothers of toddlers combine breastfeeding with formula milk. Breastfeeding together with formula milk can meet the nutritional needs of the baby. However, formula milk does not contain antibodies as well as breast milk so that babies are susceptible to diseases which, if long, will cause stunting.

The inhibiting factors for exclusive breastfeeding are erroneous beliefs and practices about baby food, the intense promotion of formula milk, and maternal and infant health problems. Given that the locus area is an area with high incomes, it is easy for mothers under five to replace breastfeeding with formula milk.

Some even think that their children become fat after being given formula milk. In addition, it was found that children who were born with abnormalities had to be treated separately from their mothers. Other reasons include children who refuse to breastfeed, breastmilk does not come out, the mother is sick (swollen breasts), the mother is pregnant and the child does not live with the mother because the mother works so the child is left in another family.

The results of this study indicated that a history of diarrheal disease was a determinant factor for the incidence of non-locus stunting (p = 0.049). The results of this study are in line with the research of Lake et al (2019) which states that children with diarrhea morbidity are predictors of stunting. Research conducted by (Berhe et al., 2019) shows that the incidence of recurrent diarrhea in children is a risk factor for stunting. The findings Mekonen, Addisu and Mekonnen, 2019) show a significant positive relationship to stunting in children who have had diarrhea in the last 2 weeks. This is also in line with the findings (Kismul et al., 2017).

Baduta children as a vulnerable group, with a weak body condition, will be susceptible to infectious diseases. This results in weaker body condition and loss of appetite, so that over time the nutritional status will deteriorate. Infectious diseases can worsen stunting because they can cause a decrease in appetite.

The level of frequency of children suffering from infectious diseases has an impact on linear growth. Many factors affect nutritional status, including direct causal factors including nutritional intake and infectious diseases. The emergence of stunting nutritional status is not only due to lack of food but also due to disease. Children who are well fed but often suffer from diarrhea or fever will eventually suffer from malnutrition (Koro et al., 2012).

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Conclusion

Based on the results of multivariate analysis, it can be concluded that the determinants of stunting in the locus are family members smoking, hand washing practices, and exclusive breastfeeding. Meanwhile, non-locus areas are a history of diarrhea and hand washing practices. It is recommended to always campaign for nutrition improvement at 1000 HPK, good and correct hand washing practices and provide hand washing facilities in public facilities.

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