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RESEARCH **Open Access**

Comparison of Indicators of Families at Risk of Stunting in High-Income Regencies and Low-Income Regencies in East Nusa Tenggara Province

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Abstract

Stunting is a condition of failure to thrive in children due to chronic malnutrition. Early detection of various indicators of families at risk of stunting is an important effort in preventing stunting in the community. This research aims to analyze the comparison of indicators of families at risk of stunting in districts with high per capita income and districts with low per capita income. The Method is secondary data research. The data source is the results of the 2021 National Population and Family Planning Agency (BKKBN) Survey of East Nusa Tenggara Province. The sample size is 878 families divided into 439 families at risk of stunting from high-income districts per capita, and 439 families at risk of stunting from low-income districts. Sampling was carried out by stratification sampling technique or layered sampling. The independent variable is an indicator of a family at risk of stunting, namely the age of the mother, education, fixed income, number of children, sources of drinking water, proper latrines, and habitable houses, and the dependent variable is income per capita in the district where the family lives. The data were identified and statistically analyzed using bivariate Chi-Square test and multivariate logistic regression with a significant p-value <0.05. The result show that the chi-square test mother's age (p = 0.31), mother's education (p=0.77), fixed family income (p=0.00), number of children (p=0.17), availability of water sources clean (p=0.67), healthy latrine ownership (p=0.82), and healthy home ownership (p=0.03). Logistic regression test results for family fixed income (p=0.00), healthy home (p=0.07). The Conclusion is mother's age, mother's education, number of children, availability of clean water sources, ownership of latrines, and healthy homes are the main indicators of the risk of stunting in families. This indicator has no difference between families living in areas with low per capita income, and families living in areas with high incomes.

Keywords: Stunting, Family Indicators at Risk of Stunting, Per Capita Income.

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1. INTRODUCTION

Stunting is a condition of failure to thrive in toddlers due to long-term malnutrition, exposure to repeated infections, and lack of stimulation which is influenced by various risk factors, namely the condition of pregnant women, toddlers' eating patterns, family economic conditions, social culture, and environmental factors such as sanitation and access to health services (Kementerian Kesehatan Republik Indonesia, 2022a). Stunting occurs as a result of malnutrition which mainly occurs during the first 1000 days of life (HPK). The condition of stunting will affect the level of intelligence of children and the health status of children during the period of growth and development into adulthood (Kementerian Kesehatan Republik Indonesia, 2018). The family has a very important role in fulfilling the nutritional intake of toddlers in preventing stunting (Wiliyanarti, Israfil, and Ruliati 2020). The incidence of stunting is very high in families who are at risk of stunting. Families at risk of stunting are families that have one or more risk factors for stunting, including having children aged 0-23 (twenty three) months, poor families, low parental education, poor environmental sanitation, and inadequate drinking water (Kemenko PMK, 2022).

The results of a study on the nutritional status of Indonesia in 2021 found that approximately 5 million Indonesian children are stunted, where one in four Indonesian children is stunted (Kementerian Kesehatan Republik Indonesia, 2022a). Indonesia is targeting the stunting rate to fall by 14% in 2024, while the stunting rate in 2021 will reach 24% (Kementerian Kesehatan Republik Indonesia, 2022a). The results of the 2022 Indonesian Nutrition Status Survey (SSGI) found that the national prevalence of stunting reached 21.6%, where the Province of East Nusa Tenggara (NTT) was found to be the province with the highest prevalence of stunting in Indonesia, namely 35.3% (Kementerian Kesehatan Republik Indonesia, 2022b). The NTT Province National Population and Family Planning Agency (BKKBN) continues to monitor and evaluate efforts to accelerate stunting reduction, especially in the first 10 regencies, namely West Sumba, Central Sumba, Southwest Sumba, East Sumba, West Manggarai, Manggarai, East Manggarai, Ngada , Ende and Nagekeo (BKKBN, 2022a) .

Gross Regional Domestic Product (GRDP) is an indicator that can be used to view the economic condition of a region in the Province of NTT. East Manggarai Regency is one of the districts with low per capita income in NTT, while East Sumba Regency is one of the districts with high per capita income (Badan Pusat Statistik, 2022a) . Total Gross Regional Domestic Product (GRDP) of East Sumba district is 16227256.00 in 2020 and 16 255 932.00 in 2021, while East manggarai district is 7416 826.00 in 2020 and 7 509 926.00 in 2021 (Badan Pusat Statistik, 2022b). The prevalence of stunting in East Manggarai Regency in 2021 was found to be 14%, and the prevalence of stunting in East Sumba Regency in 2021 was 19% (Badan Pusat Statistik, 2022a).

Stunting is a serious problem that interferes with the growth and development of children due to chronic malnutrition and recurrent infections and is a threat to the future of Indonesia (BKKBN, 2022a) . Stunting is a health problem that is higher than the national average in addition to the high problems of anemia, zinc deficiency and vitamin A in children (Miller et al., 2013) . One of the efforts to accelerate the reduction of stunting in the community is to optimize family empowerment (BKKBN, 2022b). A study found that around 76% of stunted children under five came from families whose income was below the regional minimum wage, and family income was found to be significantly related to the incidence of stunting in the community (Agustin and Rahmawati, 2021) . Determinants or family indicators related to stunting include low education, low household welfare, malnutrition during pregnancy, poor sanitation, inadequate water supply, fathers who smoke, young mothers and poor parenting (Syofyanengsih , Fajar, and Novrikasari 2022) . The purpose of this study was to analyze the comparison of indicators of families at risk of stunting in Families at Risk of Stunting in

Districts with high incomes (East Sumba Regency) and Low-income Districts (East Manggarai Regency).

2. RESEARCH METHOD

This research is secondary data research using data from the survey results of the National Population and Family Planning Agency (BKKBN) for East Nusa Tenggara Province in 2021. The population is 138,331 families. The sample in this study is a family at risk of stunting in the East Sumba and East Manggarai Regencies. The two districts selected based on the high per capita income are East Sumba District and the low per capita income are East Manggarai District. The samples were taken using the slovin formula and obtained 439 families, the total sample for the two districts was 878 families. Sampling was carried out using a stratified sampling technique or layered sampling which separated the population into two or more levels and then took samples from each level by tracing families at risk of stunting from districts, sub-districts, to sub-districts. The independent research variables are indicators of mother's age , education, fixed income, number of children, availability of clean water, healthy latrines, and healthy homes, and the dependent variable is income per capita in the district where families at risk of stunting live.

Data collection was carried out by identifying indicators of families at risk of stunting in families in the 2021 National Population and Family Planning Agency (BKKBN) data. The data was then tabulated and analyzed statistically with three stages, namely univariate analysis to describe each indicator and presented in the form of a frequency distribution table. Bivariate analysis to determine the effect of each independent and dependent variable used the *Chi Square statistical test* (X^2) with a confidence level of *ρ-value* < 0.05. Multivariate analysis was carried out to determine differences in indicators of families at risk of stunting in low-income districts (East Manggarai) and high-income districts (East Sumba). Multivariate analysis was performed using the Logistic Regression statistical test with a significant p-value <0.05.

3. RESULTS AND DISCUSSION

Table 1. Distribution of the frequency of indicators of families at risk of stunting in low-income districts (East Manggarai) and high-income districts (East Sumba) (n=878).

Indicators of Families at Stunting Risk	Regency				Amount	%
	Low Income (East Manggarai)		High Income (East Sumba)			
	n	%	n	%		
Mother's Age						
< 20 years	2	0.5	0	0.0	2	0.2
20 – 35 years	214	48.7	207	47.2	421	47.9
≥35 years old	223	50.8	232	52.8	455	51.8
Total	439	100	439	100	878	100
Mother's Education						
< SLTP	281	64.0	277	63.1	558	63.6
> SLTP	158	36.0	162	36.9	320	36.4
Total	439	100	439	100	878	100
Fixed income						
There is	398	90.7	366	83.4	764	87.0
No	41	9.3	73	16.6	114	13.0
Total	439	100	439	100	878	100
Number of children						
< 3 people	230	52.4	210	47.8	440	50.1

≥ 3 people	209	47.6	229	52.2	438	49.9
Total	439	100	439	100	878	100
Availability of Clean Water Sources						
Yes	277	63.1	271	61.7	548	62.4
No	162	36.9	168	38.3	330	37.6
Total	439	100	439	100	878	100
Ownership of Healthy Latrines						
Yes	145	33.0	142	32.3	287	32.7
No	294	67.0	297	67.7	591	67.3
Total	439	100	439	100	878	100
Healthy Home Category						
Yes	62	14.1	42	9.6	104	11.8
No	377	85.9	397	90.4	774	88.2
Total	439	100	439	100	878	100

Secondary Data, BKKBN 2021

Table 1 shows that the majority of mothers from the two districts are ≥ 35 years old with a total percentage of 51.8%, the education of mothers from the two regions is mostly low-educated < junior high school with a total percentage of 63.6%, the majority of family income from the two regions is mostly have a fixed income with a total percentage of 87.0%, the category of the number of children in families in the East Manggarai Regency area is the category < 3 people, namely 52.4%, and the highest percentage in East Sumba Regency is ≥ 3 children or 52.2%, the majority Families from the two districts have access to clean water sources with a total percentage of 62.4%, families from the two districts do not have healthy latrines with a total percentage of 67.3% and have houses that do not meet the healthy housing category with a total percentage of 88.2%. .

Table 2. Bivariate Chi-Square Test Comparison of Indicators of Families at Risk of Stunting in High-Income Districts (East Sumba) and Low-Income Districts (East Manggarai) (n=878).

Indicators of Families at Stunting Risk	**District area**				**∑**	**%**	**Pearson Chi-Square (X^2)**	**p-values**
	Low Income (East Manggarai)		**High Income (East Sumba)**					
	n	**%**	**n**	**%**				
Mother's Age								
< 20 years	2	0.5	0	0.0	2	0.2		
20 – 35 years	214	48.7	207	47.2	421	47.9	2.294	0.318
≥35 years old	223	50.8	232	52.8	455	51.8		
Total	439	100	439	100	878	100		
Mother's Education								
< SLTP	281	64.0	277	63.1	558	63.6		
> SLTP	158	36.0	162	36.9	320	36.4	0.079	0.779
Total	439	100	439	100	878	100		
Family Income								
There is	398	90.7	366	83.4	764	87.0		
No	41	9.3	73	16.6	114	13.0	10.323	0.001*
Total	439	100	439	100	878	100		

Indicators of Families at Stunting Risk	District area				∑	%	Pearson Chi-Square (X^2)	p-values
	Low Income (East Manggarai)		High Income (East Sumba)					
	n	%	n	%				
Number of children								
< 3 people	230	52.4	210	47.8	440	50.1		
≥ 3 people	209	47.6	229	52.2	438	49.9	1.822	0.177
Total	439	100	439	100	878	100		
Availability of Clean Water Sources								
Yes	277	63.1	271	61.7	548	62.4		
No	162	36.9	168	38.3	330	37.6	0.175	0.676
Total	439	100	439	100	878	100		
Ownership of Healthy Latrines								
Yes	145	33.0	142	32.3	287	32.7		
No	294	67.0	297	67.7	591	67.3	0.047	0.829
Total	439	100	439	100	878	100		
Healthy Home Category								
Yes	62	14,1	42	9,6	104	11,8		
No	377	85.9	397	90.4	774	88.2	4.363	0.037*
Total	439	100	439	100	878	100		

**Significant value < 0.05*

Table 2 shows that there is no difference in the indicators of mother's age, mother's education, number of children, availability of clean water, and ownership of healthy latrines in families at risk of stunting in high-income districts (East Sumba) and low-income districts (East Manggarai) with values p-Value > 0.05. There are differences in indicators of family income and healthy homes for families at risk of stunting in high-income districts (East Sumba) and low-income districts (East Manggarai) with a p-value <0.05.

Table 3. Multivariate Logistic Regression Test Comparison of Indicators of Families at Risk of Stunting in Low-Income Districts (East Manggarai) and High-Income Districts (East Sumba) (n=878).

Indicators of Families at Stunting Risk	District area				∑	%	Ods Ratio (Exp.B)	*p-Value*
	Low Income (East Manggarai)		High Income (East Sumba)					
	n	%	n	%				
Family Fixed Income								
There is	398	90.7	366	83,4	764	87.0		
No	41	9.3	73	16.6	114	13.0	1,876	0.003*
Total	439	100	439	100	878	100		
Healthy Home Ownership								
Yes	62	14.1	42	9,6	104	11.8		
No	377	85.9	397	90.4	774	88.2	1,471	0.071
Total	439	100	439	100	878	100		

**Significant value < 0.05*

Table 3 shows that based on the results of the multivariate test statistical logistic regression on the family income indicator and the criteria for a healthy home, the Ods value.

The ratio and p-value of each indicator is family income (Exp.B = 1.876, p-value = 0.003*), healthy home criteria (Exp.B=1.471, p-value =0.071). The results of this statistical test show that there is no difference in the criteria for healthy homes for families at risk of stunting in high-income districts (East Sumba) and low-income districts (East Manggarai). There are differences in family income indicators for families at risk of stunting in high-income districts (East Sumba) and low-income districts (East Manggarai) with a p-value <0.05.

Stunting is a serious nutritional problem and has an impact on the quality of human resources. Stunting prevention is the responsibility of all parties, not only the government but also all families throughout Indonesia (Kementerian Kesehatan Republik Indonesia, 2018). Family factors are known to have a large influence on the incidence and prevention of stunting. The family has an important role in the toddler's diet in preventing stunting (Wiliyanarti, Israfil, and Ruliati, 2020). The results of this study found no differences in indicators of mother's age, mother's education, number of children, availability of clean water, healthy latrines, and healthy homes for families at risk of stunting in low-income districts (East Manggarai) and high-income districts (East Sumba).

Age is a risk factor for stunting in toddlers. Various research results have found that there is a significant relationship between maternal age during pregnancy and the incidence of stunting in toddlers (Junus et al., 2022) . Research on the incidence of stunting in children aged 7-24 months was found to be significantly related to the age of the mother during pregnancy (Wanimbo and Wartiningsih 2020). The results of the study prove that pregnant women at a young age have a significant relationship with the incidence of stunting (Pamungkas, WD, and Nurbaety, 2021). Pregnant women at a very young age (adolescents) are closely related to the incidence of stunting in children aged 7-24 months (Wanimbo and Wartiningsih 2020) . The incidence of stunting increases when the mother's age during pregnancy is <20 or ≥35 years, the mother's upper arm circumference during pregnancy is ≥23.5cm, pregnancy is in her teens, and the mother's height is low (Nirmalasari 2020). Pregnant women with a risk age of <20 years or > 35 years have a high risk of giving birth to babies with low birth weight which will predispose to stunting in toddlers (Junus et al., 2022).

The mother's education level and knowledge about nutrition has a relationship with the incidence of stunting in toddlers (Dasril and Annita, 2019). The results of the study prove that there is a significant relationship between family income, mother's education and knowledge of mother's nutrition with the incidence of stunting in toddlers (Zurhayati and Hidayah, 2022). Previous research in the East Sumba region found that the determinants of stunting were family income, knowledge of mother's nutrition, mother's upbringing, history of disease infection, history of immunization, protein intake and mother's education (Picauly and Toy, 2013) .

The level of education and knowledge of mothers about toddler nutrition influences attitudes and behavior in choosing food ingredients which will further affect the nutritional state of toddlers (Zurhayati and Hidayah, 2022). Mothers who have a high level of education can have the ability to understand more broadly about healthy child care practices (Zurhayati and Hidayah, 2022). Mother's knowledge about good nutrition will result in a good ability to prepare healthy food for consumption. The better the mother's knowledge about toddler nutrition, the better understand mothers about the type, quantity and quality of food consumed by all family members including toddlers (Bulu, Picauly, and Sir, 2022) .

The number of family members (more than 4 people) and third-order children increases the risk of stunting in toddlers with families of low socioeconomic status (Rahmawati, Fajar, and Idris 2020). The large number of children can affect the family's ability to meet various types of food needs and appropriate nutritional intake for each child. The way people know and provide healthy food for children and the habit of eating healthy food available in the family is found to have a significant relationship with the incidence of stunting in children (Nugraha

2019). Low family income, low mother's education and knowledge of nutrition are factors that aggravate the condition of families with a large number of children to meet the nutritional needs of children in an effort to prevent stunting (Zurhayati and Hidayah, 2022). It is important to monitor the nutritional status of the mother before becoming pregnant and provide nutritional interventions in the early 1000 days of life for the risk of stunting and other health problems such as cardiometabolic risk later in life (Lada, et al., 2018).

The availability of clean water is one of the factors related to the prevention of stunting. The results of the study found that drinking water that was not treated had an influence on the incidence of stunting (Nirmalasari 2020). The availability of clean drinking water is related to the adequacy of water and minerals, and the provision of micronutrients and macronutrients during critical growth periods in toddlers which are needed during the process of metabolizing nutrients for growth and development (Beal et al. 2018). Children from families or households with unhealthy latrines and clean drinking water that is not properly treated have a higher risk of stunting (Beal et al. 2018). This condition is related to the presence of E Coli bacteria in the water which is one of the one cause of gastrointestinal infections in children. Research has shown that clean water samples from PADAM and well water that have not been properly treated for drinking have a high content of Escherichia coli bacteria (Restina et al., 2019). A study of bacteria in stunted patients found that the number of E. coli bacteria in the stunted toddler group was higher than the normal toddler group (Helmyati et al., 2017) . Water factors (inappropriate drinking water sources, drinking water treatment), sanitation factors (use of toilet facilities, open defecation behavior, improper disposal of toddler feces in latrines) are important factors related to the incidence of stunting in children under five in families in Indonesia. Water and sanitation are important factors related to stunting among toddlers in Indonesia (Olo, Mediani, and Rakhmawati 2021).

The use of latrines that do not meet health requirements, the practice of open defecation, and the disposal of children's feces not in the latrines cause children to be contaminated with environmental pollution, making it easier for the transmission of pathogens originating from feces and at risk of increasing the prevalence of diarrhea, intestinal worms and the incidence of stunting in children under five (Olo, Mediani, and Rakhmawati, 2021). In a study of toddlers in one of the districts in NTT, it was found that 36% of children had anemia (Hb level <11 mg/100 mL), 68% lacked vitamin A (level plasma vitamin A < 0.8 mumol/L) and 50% zinc deficiency (plasma zinc <9.94 mumol/L).All children except one were positive for intestinal parasites (Lada, 2018).

The habit of defecating in open places such as rivers or gardens or inadequate latrines has an influence on the risk of stunting (Nirmalasari, 2020) . This condition occurs because human feces can become a medium for various insects to spread bacteria. The spread of bacteria by insects that contaminate food or eating utensils for toddlers is at risk of causing diarrhea. A history of frequent diarrhea in the last 3 months and poor hygiene practices increases the risk by 3.619 and 4,808 times the incidence of stunting in toddlers aged 24-59 months (Desyanti and Nindya 2017). Diarrhea that occurs repeatedly causes toddlers to lose electrolyte fluids and adequate nutrition for growth and ultimately increases the risk of stunting (Nirmalasari, 2020). The results of the study have proven that in addition to increasing knowledge of mothers and families about nutrition, efforts to reduce the incidence of stunting in families at risk also require interventions to improve environmental sanitation, construct latrines that meet health requirements, carry out health promotion efforts with education to increase public awareness (Olo, Mediani , and Rakhmawati 2021).

A healthy house is a house that meets health standards with good management of basic sanitation. The results of the study found that there was a significant relationship between basic sanitation in the household and the incidence of stunting (Fibrianti, Thohari, and Marlik, 2021). Basic sanitation meant in a healthy household is having clean water facilities, having latrines,

waste water management, waste management, clean and healthy food management (Fibrianti, Thohari, and Marlik, 2021). Research proves that there is a significant relationship between the availability of latrines, sources of clean water and the incidence of stunting in the family (Zairinayati and Purnama, 2019). The availability of basic sanitation in healthy homes is the basis for efforts to prevent various types of infectious diseases that are at risk of causing stunting in toddlers. Management of drinking water in the household to prevent high Escherichia coli bacterial infections (Restina et al., 2019), (Helmyati et al. 2017). Availability of healthy latrines in the household to prevent the spread of bacteria causing diarrhea which is at risk of causing stunting (Desyanti and Nindya, 2017), (Nirmalasari 2020).

The results of this study found that there were differences in indicators of fixed family income for families at risk of stunting in low-income districts (East Manggarai) and high-income districts (East Sumba). Family income or economic status is one of the main causes of stunting in the community. Family socioeconomic factors are significantly related to the incidence of stunting, namely family income and parental education (Oktavia 2021). Around 76% of families with stunted toddlers are families with incomes below the regional minimum wage (Agustin and Rahmawati, 2021). The incidence of stunting which is influenced by family income has a 7 times greater risk in families with incomes less than the regional minimum wage (Agustin and Rahmawati, 2021). Unfavorable economic status will have an impact on the nutritional status of children where children will have disrupted growth and development such as being thin or short (Agustin and Rahmawati, 2021). Increasing family income will be able to increase family opportunities to buy food with good quality and better quantity, conversely a decrease or low family income will also cause a decrease in the purchasing power of good food for family members both in quality and quantity (Wahyuni and Fitrayuna 2020). One of the nutrient-rich plants that is actually affordable in the community is Moringa leaves (Moringa oleifera). Aside from being a vegetable, Moringa leaves can be processed into pudding or cakes as additional snacks for toddlers. The results of the study found that there were more changes in nutritional status in elementary school children who had been given pudding made from processed moringa leaves (Meko et al., 2019).

Families or households with low and poor economic income have a higher probability of having a stunted toddler. This condition is related to the availability of food in the household (Laksono, Kusrini, and Megatsari, 2021). However, these factors still depend on how the family implements the income they have in meeting the nutritional needs of their children. This condition will be influenced by various factors including education or family knowledge (Oktavia, 2021) . High income which is not matched by adequate knowledge of nutrition can also cause families to become consumptive with eating patterns that do not match the quality and quantity of nutrition expected for the health of toddlers (Wahyuni and Fitrayuna 2020).

4. CONCLUSION

There are no differences in the indicators of mother's age, mother's education, number of children, availability of clean water sources, ownership of latrines and healthy homes for families at risk of stunting in districts with high per capita income and in districts with low per capita income. Mother's age, mother's education, number of children, availability of clean water sources, latrines, and healthy homes are the main indicators of the risk of stunting in families, both in families living in areas with low per capita income, and in families living in areas with high incomes. Health promotion in increasing family knowledge about the risk of stunting must be continuously improved for both family members who live in areas with low per capita income and families who live in areas with high per capita income.

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