ORIGINAL RESEARCH ARTICLE

Risk Factor Analysis of Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency, Indonesia

Agussalim[1*], Andi Zulkifli[2], Nur Nasry Noor[3], Ansariadi[4], Stang[5], Shanti Riskiyani[6]

[1-6]Hasanuddin University, Makassar, Indonesia

DOI: 10.55489/njcm.150720244014

ABSTRACT

Background: The high rate of stunting is still a nutritional problem in children in Indonesia which has an impact on the quality of future generations. The study aims to determine the risk factors for stunting in children aged 6-23 months in Tanralili District, Maros Regency.

Methodology: This study used a case control study design. The sampling technique uses the side exhaustive method with a ratio of 1: 1, as many as 260 samples consisting of 130 cases and 130 controls. Stata program version 17 is used for data analysis.

Results: Risk factors associated with stunting were maternal age <20 or 35 years (OR=1.953), lower-middle family income (OR=1.947), antenatal care <4 visits (OR=1,820), anemia (OR=2.252), chronic energy deficiency (OR=2.261), low birth weight (OR=2,595), exclusive breastfeeding (OR=2.448), poor home sanitation (OR=2.226;). Working mothers are a protective factor against stunting (OR=0.819). Multivariate analysis shows that exclusive breastfeeding is the dominant risk factor for stunting.

Conclusion: Risk factors for stunting come from mother, child, as well as environmental and family economic factors. The need for integrated and multisectoral programs to increase family income, access to proper home sanitation, maternal education on pregnancy and nutrition and exclusive breastfeeding to reduce the incidence of stunting.

Key-words: Stunting, exclusive breastfeeding, anemia, low birth weight, household sanitation

ARTICLE INFO

Financial Support: None declared

Conflict of Interest: None declared

Received: 07-04-2024, **Accepted**: 31-05-2024, **Published**: 01-07-2024

***Correspondence:** Agussalim (Email: agust4d@gmail.com)

How to cite this article: Agussalim, Zulkifli A, Nasry Noor N, Ansariadi, Stang, Riskiyani S. Risk Factor Analysis of Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency, Indonesia. Natl J Community Med 2024;15(7):559-565. DOI: 10.55489/njcm.150720244014

www.njcmindia.com | pISSN: 0976-3325 | eISSN: 2229-6816 | Published by Medsci Publications

INTRODUCTION

The quality of Indonesia's generation is still faced with the challenge of high stunting prevalence. Stunting is a condition of failure to thrive in children under five due to chronic malnutrition, especially in the first 1,000 days of life.[1] Globally, 148.1 million children under the age of 5 are stunted, 45 million are underweight, and 37 million are overweight.[2] Almost all affected children live in Asia (52% of the total global population) and Africa (43% of the total global population).[2]

The prevalence of stunting in Indonesia is 21.6%, this figure is still high, considering that the target of stunting prevalence in Indonesia in 2024 is 14% and the WHO standard is below 20%.[3]The prevalence of stunting in South Sulawesi Province reached 27.2%.[4] Maros Regency is the six regions with the highest percentage in South Sulawesi Province with a stunting prevalence of 11.1%.[4] Tanralili is a sub-district in Maros Regency with an increasing prevalence of stunting.[5]

Pregnancy under the age of 20 can cause problems because it affects organs like the uterus, even babies can be premature and birth weight less. This is because women who are pregnant young have not been able to provide food supply properly from their bodies to the fetus in their womb. Income is an important factor in determining the quality and quantity of food, if family income is sufficient, it affects children's growth and development because parents can meet all children's needs, both primary and secondary.[6]

Routine antenatal care can detect early high-risk pregnancy conditions such as anemia and a history of chronic energy deficiency which are also risk factors for stunting. Research shows that a risk factor in the first 1000 days of life that can increase the incidence of stunting is a history of anemia in the third trimester of pregnancy.[7] Chronic energy deficiency in pregnant women measured using upper arm circumference is associated with stunting (p = 0.001).[8] In addition, children aged 6-23 months with a history of low birth weight are at risk of stunting 4 times.[9] Up to 6 months of age, babies are recommended to consume only exclusive breast milk. WHO estimates that 50% of malnourished childhood is associated with poor sanitation.[10] The scope of environmental hygiene includes the home environment, clean water and drinking water facilities and family latrine facilities.[11]

The purpose of the study was to assess the risk factors for stunting in children aged 6-23 months in Tanralili District, Maros Regency.

METHODOLOGY

Study Design: This type of research uses a case control study design. The research was conducted in the working area of the Tanralili Health Center, Maros Regency, South Sulawesi Province, in February-March 2024.

Population and Sample: The population of this study was children aged 6 to 23 recorded in the Tanralili Health Center report. The research sampling technique used exhaustive sampling method, by taking all stunting cases as many as 130 children. The group of cases is children aged 6 to 23 months who are stunted with the criterion of body length = <-2 SD to <-3 SD. The control group was children aged 6 to 23 months who were not stunted. The control group used a ratio of 1: 1, so that the number of control samples was 130 children using a matching technique that considers the mother's education level as a controlled variable. The level of maternal education is a controlled variable because it has the potential to be a confounding factor that can affect the main focus of research, maternal education affects knowledge related to pregnancy and parenting.[12] So that the level of education of mothers in the case group was adjusted to the control group.

Research Variables: The dependent variable in this study is the incidence of stunting in children. The independent variables in this study are:

The age of the mother during pregnancy is the age of the mother during pregnancy as seen based on the ANC book or interview, categorized as high risk if the age of the mother during pregnancy is between < 20 and >35 years and low risk if the age of the mother during pregnancy is between 20 to 35 years.

Mother's work is the main activity that mothers do and earn income from these activities. Categorized as high risk if the mother works while the risk is low if the mother does not work.

Family Income is the total amount of income earned by the head of the family, mother and family members. High risk if income < US $ 3.65 people/day and low risk if income ≥ US $ 3.65 people/day.[13]

History of *antenatal care*, namely the history of maternal pregnancy checks seen from the antenatalcare book. Categorized as high risk if under 4 examinations and low risk if complete pregnancy checks ≥4 times.

History of anemia of mothers during pregnancy is the hemoglobin (Hb) level of pregnant women recorded in antenatalcare books. Categorized if the risk is high if the hemoglobin level is <11 g/dl and low risk if the hemoglobin level is ≥ 11 g/dl.

History of birth weight is the weight of children who are weighed within 48 hours after birth in grams recorded in the birth book. Categorized as high risk if the child's birth weight < 2,500 grams and low risk if the child's birth weight ≥ 2,500 grams.

History of chronic lack of energy is a condition of pregnant women who experience the risk of chronic lack of energy characterized by the size of the upper

arm circumference with < 23.5 cm recorded in the antenatalcare book during pregnancy. Categorized as high risk if the size of the arm circumference < 23.5 cm and low risk if the size of the arm circumference ≥ 23.5 cm.

Exclusive breastfeeding is giving breast milk alone without other food and drinks to babies from birth to 6 months of age. Categorized as high risk if the child is given fluids and additional food at the age of the first 6 months of birth and low risk if only given breast milk for 6 months without additional food and fluids.

Household sanitation includes house components, sanitation facilities and the behaviour of residents of the house by making observations, interviews and assessments that are examined using healthy house assessment forms according to the technical guidelines for healthy house assessment Decree of the Minister of Health of Indonesia Year 1999.[14] The risk category is high if the total questionnaire score is < 1068 and the risk is low if the questionnaire value ≥ is 1068.

Data Collection: Data collection using interview method using electronic questionnaire. Respondents were obtained from secondary data from the measurement of children's body length in the recording of puskesmas. Researchers were assisted by nutritionists in home visits that took about 15-20 minutes for each respondent to take measurements of body length and interviews. Body length measurement is done using an instrument where the child is measured supine using an infantometer measuring board to find accurate results.

Data Processing and Analysis: Data processing and analysis using the Stata program version 17. The magnitude of the risk factor for each independent variable against the dependent variable was analysed using the Odds Ratio test. While the multivariate analysis used a logistic regression test where the confidence level was 95% (α = 0.05).

Ethical Approval: This research has been approved by the Hasanuddin University Health Research Ethics Committee number 356/UN4.14.1/TP.01.02/2024 on February 1, 2024. The existence of informed consent is given to respondents so that data confidentiality and patient privacy are guaranteed.

RESULTS

Based on Table 1, as many as 75 children (57.69%) with stunting cases are men. For the child age group, the majority of stunting cases are dominated by children aged between 18-23 months with 72 cases (55.38%). A total of 20 mothers aged over 35 years during pregnancy or 15.38% and under 20 years as many as 17 mothers (13.08%). The majority of the education levels of mothers in the case group were mothers with a high school education level and only 10 mothers with a college education level. The mother's occupation for the case group and the control group was housewives, respectively at 92.31% in the case group and 90.77% in the control group. The majority of respondents' family income above Rp 1,954,038.00 was 73.85% in the case group and 84.62% in the control group, respectively. The average mother experienced anemia in the first trimester in both the case group and the control group, respectively 31 respondents (23.85%) in the case group and 30 mothers (23.08%) in the control group.

Table 2, showing maternal age < 20 or >35 years (OR=1.953; 95%CI=1.03-3.73), family income (OR=1.947; 95%CI=1.01-3.82), antenatalcare < 4 times (OR=1.820; 95%CI=1.002-3.329), and history of maternal anemia (OR=2.252; 95%CI=1.33-3.82), history of chronic maternal energy deficiency during pregnancy (OR=2.261; 95%CI=1.21-4.29), birth weight of the child (OR=2.595; 95%CI=1.25-5.57), Exclusive breastfeeding (OR=2.448; 95%CI=1.24-4.96), home sanitation (OR=2.226; 95%CI=1.01-5.13). Meanwhile, working mothers were protective factors against stunting (OR=0.819; 95%CI=0.30-2.16).

Table 1: Case Distribution and Control Based on Respondent Characteristics in Tanralili District, Maros Regency in 2024

Characteristics of Respondents	Case (n=130) (%)	Control (n=130) (%)
Child gender		
Man	75 (57.69)	71 (54.62)
Woman	55 (42.31)	59 (45.38)
Children's age group		
6 – 11 Months	25 (19.23)	52 (40)
12 – 17 Months	33 (25.38)	40 (30.77)
18 – 23 Months	72 (55.38)	38 (29.23)
Age group of mothers during pregnancy		
< 20 Years	17 (13.08)	6 (4.62)
20 – 35 Years	93 (71.54)	108 (83.08)
> 35 Years	20 (15.38)	16 (12.31)
Mother's Education		
Elementary School	34 (26.15)	34 (26.15)
Junior High School	31 (23.85)	31 (23.85)
Senior High School	55 (42.31)	55 (42.31)
College	10 (7.69)	10 (7.69)
Mother's Work		
Not Working (Housewife)	120 (92.31)	118 (90.77)
Farmer	1 (0.77)	1 (0.77)
Labor	0 (0)	3 (2.31)
Honorary smployees	1 (0.77)	2 (1.54)
Self employed	4 (3.08)	2 (1.54)
Civil servant	0 (0)	2 (1.54)
Other	4 (3.08)	2 (1.54)
Family income		
≤ IDR 1.954.038	34 (26.15)	20 (15.38)
> IDR 1.954.038	96 (73.85)	110 (84.62)
Gestational age of the mother has anemia		
No Anemia	50 (38.46)	76 (58.46)
First Trimester	31 (23.85)	30 (23.08)
Second Trimester	26 (20)	13 (10)
Third Trimester	23 (17.29)	11 (8.46)

Source: Primary Data, 2024

Table 2: Results of Bivariate Analysis of Risk Factors for Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency in 2024

Risk Factors	Case (n=130) (%)	Control (n=130) (%)	OR	(95% CI)	p-value
Age of the mother during pregnancy					
<20 and >35 Years	37 (28.46)	22 (16.92)	1.953 ref	1.03 – 3.73*	0.0263
20 – 35 Years	93 (71.54)	108 (83.08)			
Mother's work					
Work	10 (7.69)	12 (9.23)	0.819 ref	0.30 – 2.16	0.6558
Does not work	120 (92.31)	118 (90.77)			
Family income					
< US $ 3.65	34 (26.15)	20 (15.38)	1.947 ref	1.01 – 3.82*	0.0323
≥ US $ 3.65	96 (73.85)	110 (84.62)			
Antenatal care					
Visit <4 times	42 (32.31)	27 (20.77)	1.820 ref	1.002–3.33*	0.0351
Visit ≥4 times	88 (67.69)	103 (79.23)			
Anemia during pregnancy					
Hb <11 g/dl	80 (61.54)	54 (41.54)	2.252 ref	1.33 - 3.82*	0.0013
Hb ≥11 g/dl	50 (38.46)	76 (58.46)			
Chronic lack of energy during pregnancy					
<23.5 cm	41 (31.54)	22 (16.92)	2.261 ref	1.21 - 4.29*	0.006
≥23.5 cm	89 (68.46)	108 (83.08)			
Child birth weight					
<2.500 gram	31 (23.85)	14 (10.77)	2.595 ref	1.25 – 5.57*	0.0053
≥2.500 gram	99 (76.15)	116 (89.23)			
Exclusive breastfeeding					
Not exclusive breastfeeding	113 (86.92)	95 (73.08)	2.448 ref	1.24 – 4.96*	0.0053
Exclusive breastfeeding	17 (13.08)	35 (26.92)			
Household sanitation					
Score <1068	118 (90.77)	106 (81.54)	2.226 ref	1.01 – 5.13*	0.0312
Score ≥1068	12 (9.23)	24 (18.46)			

*Candidate variables to be continued in multivariate analysis

Table 3: Results of Bivariate Analysis of Maternal Anemia During Pregnancy on the Incidence of Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency in 2024

Risk Factors	Case (n=130) (%)	Control (n=130) (%)	OR	(95% CI)	p-value
First Trimester Anemia					
Hb < 11 g/dl	31 (23.85)	30 (23.08)	1.044	0.56 - 1.93	0.8836
Hb ≥ 11 g/dl	99 (76.15)	100 (76.92)			
Second Trimester Anemia					
Hb < 11 g/dl	26 (20)	13 (10)	2.25	1.05 – 5.02	0.024
Hb ≥ 11 g/dl	104 (80)	117 (90)			
Third Trimester Anemia					
Hb < 11 g/dl	23 (17.69)	11 (8.46)	2.325	1.03 – 5.53	0.0273
Hb ≥ 11 g/dl	107 (82.31)	119 (91.54)			

Table 4: Results of Multivariate Analysis of Logistic Regression Risk Factors for Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency in 2024

Variable	p-value	OR	(95% CI)
Age of Mother <20 or >35 During Pregnancy	0.098	1.723	0.904 – 3.285
Family Income < US$ 3.65	0.101	1.777	0.894 – 3.533
ANC treatment < 4 times	0.218	1.472	0.796 – 2.723
Anemia (Hb < 11 g/dl)	0.016	1.966	1.133 – 3.412
Chronic Energy Deficiency	0.066	1.829	0.962 – 3.481
Low Birth Weight (< 2.500 grams)	0.009	2.756	1.286 – 5.904
Not Exclusive Breastfeeding	0.008	2.599	1.286 – 5.255
Poor Home Sanitation (Score <1068)	0.078	2.127	0.919 – 4.921

Table 5: Final Results of Multivariate Logistic Regression Analysis of Risk Factors for Stunting in Children Aged 6-23 Months in Tanralili District, Maros Regency in 2024

Variable	p-value	OR	(95% CI)
Anemia (Hb < 11 g/dl)	0.001	2.431	1.449 – 4.078
Low Birth Weight (< 2.500 grams)	0.011	2.538	1.243 – 5.182
Not Exclusive Breastfeeding	0.004	2.674	1.374 – 5.200

Table 3, shows that mothers who experience anemia during the second and third trimesters of pregnancy are risk factors for stunting, respectively, namely second trimester anemia (OR=2.25; 95%CI=1.05-5.02) and third trimester anemia (OR=2.325; 95%CI=1.03-5.53). First-trimester anemia was not a significant risk factor for stunting (OR=1.044; 95%CI=0.56-1.93).

Table 4, showing the results of multivariate analysis using logistic regression analysis, obtained three statistically significant variables, namely the history of maternal anemia during pregnancy, the history of the child's birth weight and the history of exclusive breastfeeding. Table 5, shows that exclusive breastfeeding is the most dominant variable in stunting with an AOR value of 2,674 and a CI LL-UL value of 95%, which is 1,374 – 5,200. This showed that children aged 6-23 months who did not get exclusive breastfeeding had a risk of stunting 2,674 times compared to children who were exclusively breastfed after controlling for factors such as the child's birth weight history and the mother's history of anemia during pregnancy.

DISCUSSION

Research shows that the age of mothers under 20 or over 35 years is a risk factor for stunting. According to research Manggala (2018) states that mothers who are too young and too old have four times the risk of having stunting offspring compared to ideal age mothers.[15] Research conducted in Ghana also shows that children whose mothers are aged 25-34 years are less likely to be stunted than children whose mothers are aged 15-24 years.[16] Another study showed that the age of pregnant women had no relationship with the incidence of stunting in toddlers in Depok City (p-value 0.305).[17] Pregnancy in old age is at high risk which can increase the risk of hypertension.

The results found that working mothers are a protective factor against the incidence of stunting. Another study showed the same thing that there was no significant effect between working mothers and non-working mothers on the nutritional status of toddlers at Landono Health Center.[18] This is due to the absence of differences in the parenting style of working mothers with housewives. Several companies and government agencies in Maros Regency have provided lactation corners that are deliberately provided so that working mothers can take the time to breastfeed their babies. In contrast to Mafuah's (2022) research which explains that working mothers are 21 times more likely to have children with stunting than non-working mothers.[19]

The results of the analysis found that lower-middle-income families are a risk factor for stunting. In line with Kassaw's research (2020) conducted in Ethiopia, lower-middle-income families have a 1.92-fold higher risk of stunting than upper-middle-income families.[20] Families with high economic status are able to supply their children's needs well by choosing nutritious and varied foods. However, Juwita's (2019) research shows no significant relationship between family income and the incidence of stunting (p value = 0.071).[21] Families with high incomes do not necessarily have a good nutritional status, but increasing income automatically increases the opportunity to choose food ingredients and increase consumption with good nutritional content.

The results showed that a history of antenatalcare under 4 examinations became a risk factor for stunting. Supported by Darmawan's research (2022), the history of antenatal care visitsis a risk factor for stunting in toddlers at the Lakudo Health Center.[22] Other studies have also shown that the quality of antenatalcare has a significant relationship with the incidence of stunting.[23] Antenatalcare in accordance with standards will make it easier for health workers to monitor fetal growth and development optimally.

In addition, a history of maternal anemia during pregnancy is a risk factor for stunting in children. In line with Pasalina's research (2023) shows that stunting occurs in toddlers with anemic mothers compared to mothers who do not have a history of pregnancy anemia ($p< 0.05$).[24] The availability of iron contained in the mother's body during pregnancy makes the condition of fetal development better. [25] This study found that the incidence of anemia during the first trimester is not a significant risk factor for stunting due to immediate early intervention by health workers, anemia in maternal pregnancy that occurs during the third trimester and the absence of significant intervention are factors for babies experiencing growth failure and development at risk of stunting. [26]

Chronic maternal energy deficiency during pregnancy is a risk factor for stunting in children. This is supported by Adila's (2023) research that mothers who experience chronic energy deficiency have 11,278 times risk of giving birth to stunted children.[8] However, in contrast to research conducted in Bantul Regency showed that there was no relationship between pregnant women with chronic energy deficiency and stunting toddlers ($p = 0.23$).[25] There is an additional feeding program for pregnant women suffering from chronic energy deficiency in Tanralili District as a form of prevention so that the fulfillment of maternal and fetal nutrition in the womb is fulfilled, so that the fetus can grow and develop properly.

In addition, low birth weight is also a risk factor for stunting in children. In line with research that found that children aged 6-23 months with a history of low birth weight are at risk of stunting 4 times. [27] Another study conducted in Gorontalo found different results where there was no relationship between low

birth weight and the incidence of stunting.[28] Children born with low birth weight will not affect the growth process if the child gets nutritional intake and lives in the same house with good environmental sanitation conditions.

The results of the OR test show that a history of exclusive breastfeeding is the most dominant risk factor for stunting in children. In line with research conducted in Tanzania, children who are not exclusively breastfed have a risk of stunting 4.29 times compared to children who are exclusively breastfed.[29] They complain a lot about breast milk that is not smooth so they decide to give formula milk as a substitute for breast milk. This will result in disruption of infant growth and development because exclusive breastfeeding is a protective factor against stunting. This is contrary to Astria Paramashanti's research (2015), that there is no relationship between exclusive breastfeeding and the incidence of stunting in children aged 6-23 months.[30] The frequency and duration of the mother giving breast milk is not appropriate so that it is not sufficient for the child's nutritional intake.

Poor sanitation is a risk factor for stunting in children. Research conducted in East Tanjung Jabnung Regency also found the same thing that the incidence of stunting is related to latrine facilities, clean water facilities, wastewater disposal and waste management.[31] Environmental sanitation becomes a contributing factor to the development of infectious diseases. He's research (2018) concluded that the provision of clean water, poor hygiene and sanitation are important contributors to infectious diseases such as acute respiratory infections and diarrhea that affect children's growth and development.[32]

The Power of Research

The measurement of the child's body length is carried out by a trained enumerator, so that the criteria for the group of stunting cases are confirmed correctly. In addition, the study looked at each risk factor for stunting, both specific and sensitive risk factors. Research also identifies the trimester of pregnancy of anemic mothers to the incidence of stunting, which is still little research that identifies it.

Limitations

Researchers did not explore the history of the quality of complementary feeding. Although the factor of ownership of healthy latrine facilities is taken as an indicator of home sanitation, people's habits in using healthy latrines are not identified. The need for in-depth qualitative research in order to determine the causal relationship of stunting in children so that decision making and intervention are more targeted.

Conclusion

Research shows that stunting is a multisectoral and long-term problem that must be solved by all parties. The importance of intervention to at-risk groups such as poor families with poor home sanitation conditions, mothers with insufficient pregnancy knowledge and children with low birth weight and exclusive breastfeeding is still lacking. Research finds that exclusive breastfeeding is the dominant risk factor for stunting. The need for appropriate intervention programs so that children's right to exclusive breastfeeding can be fulfilled so that the target of Sustainable Development Goals (SDGs) 2, namely eliminating hunger and all forms of malnutrition by 2030 can be achieved.

Acknowledgement

The authors would like to thank all participants in the study for the contributions and their families. The involvement of Tanralili Health Center was very helpful in this research.

References

1. Indonesian Ministry of Health. Get to Know More about Stunting [Internet]. Directorate of Health Services Ministry of Health2023 [cited 2024 Jan 7]; Available from: https://yankes.kemkes.go.id/view_artikel/2657/mengenal-lebih-jauh-tentang-stunting
2. UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates. Levels and Trends in Child Malnutrition [Internet]. 2023 [cited 2024 Jan 7]. Available from: https://iris.who.int/bitstream/handle/10665/368038/9789240073791-eng.pdf?sequence=1
3. Indonesian Ministry of Health. Stunting Prevalence in Indonesia Drops to 21.6% from 24.4% [Internet]. Sehat Negeriku2023 [cited 2024 Mar 28]; Available from: https://sehatnegeriku.kemkes.go.id/baca/rilis-media/20230125/3142280/prevalensi-stunting-di-indonesia-turun-ke-216-dari-244/
4. Ministry of Home Affairs. Report of the First Semester of the Team for the Acceleration of Stunting Reduction in South Sulawesi Province in 2023 [Internet]. Sulawesi Selatan: 2023 [cited 2024 Jan 7]. Available from: https://aksi.bangda.kemendagri.go.id/emonev/assets/uploads/laporan_pro/laporan_pro_73_periode_5_1689336282.pdf
5. Febrianti F, Dewi I, Hasnita. The Relationship Between Low Birth Weight and Infectious Diseases with the Incident of Stunting in Toddlers. JIMPK [Internet] 2023 [cited 2024 Apr 30];3(1):21–9. Available from: https://jurnal.stikesnh.ac.id/index.php/jimpk/article/view/1295
6. Kusuma AN. Nutritional Problems of Toddlers and Its Relationship with Indonesia's Public Health Growth Index. 2022;20. Available from: https://doi.org/10.14704/NQ.2022.20.15.NQ88259
7. Mulyasari I, Jatiningrum A, Setyani AP, Roro R, Septi Kurnia S. Risk Factors of Stunting on The First Thousand Days of Life.

Amerta Nutrition [Internet] 2022;6(1SP):177–83. Available from: https://doi.org/10.20473/amnt.v6i1SP.2022.177-183

8. Adila WP, Sri Yanti R, Mayetti. Science Midwifery The relationship of chronic energy deficiency (CED), exclusive breastfeeding, and economic with stunting in Nagari Aua Kuning West Pasaman. Science Midwifery 2023;10(6):2721–9453. Doi: 10.35335/midwifery. v10i6.1165

9. Lestari W, Margawati A, Rahfiludin MZ. Risk Factors for Stunting in Children Aged 6-24 Months in Penanggalan Sub-district, Subulussalam City, Aceh Province. Jurnal Gizi Indonesia [Internet] 2014;3(1):37–45. Available from: https://doi.org/10.14710/jgi.3.1.126-134

10. Prüss-Üstün A, Bos R, Gore F, Bartram J. Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health. WHO [Internet] 2008 [cited 2024 Mar 24]; Available from: https://www.researchgate.net/ publication/277802990

11. Firdausi RA, Thohari I, Kriswandana F, Marlik M. Basic Home Sanitation and Defeating Behavior on The Incident of Diarrhea In Coastal Communities. Ruwa Jurai [Internet] 2023;17(2):72–80. Available from: http://dx.doi.org/10.26630/rj.v17i2.4004

12. WHO. Childhood Stunting: Context, Causes and Consequences WHO Conceptual framework [Internet]. 2013 [cited 2024 Mar 28]. Available from: https://www.who.int/publications/m/item/childhood-stunting-context-causes-and-consequences-framework

13. Alaydrus H. Expenditure Below IDR 17.851 / Day [Internet]. CNBC Indonesia2023 [cited 2024 Mar 22]; Available from: https://www.cnbcindonesia.com/news/20230119080431-4-406648/kategori-miskin-di-ri-pengeluaran-di-bawah-rp-17851---hari

14. Indonesian Ministry of Health. Minister of Health Decree No. 829/Menkes/SK/VII/1999 Concerning Housing Health Requirement [Internet]. Jakarta: 1999. Available from: https://bahan-ajar.esaunggul.ac.id/tpl313/wp-content/ uploads/sites/996/2019/11/TPL306-Pembangunan-Perumahan-Pertemuan-3.pdf

15. Manggala AK, Kenwa KWM, Kenwa MML, Sakti AAGDPJ, Sawitri AAS. Risk factors of stunting in children aged 24-59 months. Paediatr Indones 2018;58(5):205–12. Available from: http://dx.doi.org/10.14238/pi58.5.2018.205-12

16. Darteh EKM, Acquah E, Kumi-Kyereme A. Correlates of stunting among children in Ghana. BMC Public Health 2014;14(1):1–7. Doi: 10.1186/1471-2458-14-504

17. Mutingah Z, Rokhaidah R. The Relationship of Mother's Knowledge and Attitudes with Stunting Prevention Behavior in Toddler. Jurnal Keperawatan Widya Gantari Indonesia 2021;5(2):49–57. Doi: 10.52020/jkwgi.v5i2.3172

18. Ayu Rahmawati D, Zakiah V, Mutmainna R. The Relationship Between Education and Maternal Work with the Incidence of Stunting in Toddlers 24 – 60 Months at the Landono Health Center. Jurnal Ners 2023;7(2):1249–97. Available from: https://doi.org/10.31004/jn.v7i2.17280

19. Marfuah D, Pertiwi D, Kusudaryati D, Kurniawati N. The Difference from Mother's Education, Mother's Occupation and History of Providing Weaning Food in Stunting and Non Stunting Toddlers in the Trucuk II Public Health Center Klaten. LPPM PTMA [Internet] 2022;292–305. Available from: https://repository.urecol.org/index.php/proceeding/article/view/2445

20. Kassaw MW, Bitew AA, Gebremariam AD, Fentahun N, Açik M, Ayele TA. Low Economic Class Might Predispose Children under Five Years of Age to Stunting in Ethiopia: Updates of Systematic Review and Meta-Analysis. J Nutr Metab 2020; 2020:1–24. Doi: 10.1155/2020/2169847

21. Juwita S, Andayani H, Bakhtiar, Sofia, Anidar. The Relationship between Total Family Income and Completeness of Basic Immunization with the Incidence of Stunting in Toddlers in Pidie Regency. Jurnal Kedokteran Nanggroe Medika 2019;2(4):1–10.

22. Darmawan A, Reski R, Andriani R. ANC visits, Integrated Health Service Post (Posyandu), and immunization with stunting in children under five in Central Buton District. AcTion: Aceh Nutrition Journal [Internet] 2022;7(1):33–40. Available from: http://dx.doi.org/10.30867/action.v7i1.469

23. Wahyuni E, Endyka Erye F, Atika. Relationship of Quality of Antenatal Care (ANC) to Stunting Events in Children Age 24-59 Months in Indonesia Using Literature Review Method. MIKIA 2021;5(1):65–75. Doi: 10.36696/mikia.v5i1.61

24. Pasalina P, Fil Ihsan H, Devita H. Relationship Between a History of Pregnancy Anemia and The Incidence of Stunting in Toddlers. Jurnal Kesehatan [Internet] 2023;12(2):267–71. Available from: https://doi.org/10.46815/jk.v12i2.178

25. Warsini KT, Hadi H, Nurdiati DS. History of SEZ and anemia in pregnant women is not related to the incidence of stunting in children aged 6-23 months in Sedayu District, Bantul, Yogyakarta. Jurnal Gizi dan Dietetik Indonesia (Indonesian Journal of Nutrition and Dietetics) [Internet] 2016;4(1):29. Available from: http://dx.doi.org/10.21927/ijnd.2016.4(1).29-40

26. Saapiire F, Dogoli R, Mahama S. Adequacy of Antenatal Care Services Utilisation and its Effect on Anaemia in Pregnancy. J Nutr Sci 2022;11(e80):1–8. Doi: 10.1017/jns.2022.80

27. Ilmi Idrus N, Zulkifli A, Arsin Aa, Ansariadi, Riskiyani S. Determinants of Stunting in Children Aged 6-24 Months at Pambusuang Health Centre Working Area, Polewali Mandar Regency, Indonesia. Natl J Community Med 2023;14(12):842–8. Doi: 10.55489/njcm.141220233435

28. Badjuka BYM. The Correlation between Low Birth Weight and Stunting in 24-59 Month Children in Haya-HayaVillage, Gorontalo. Afiasi 2020;5(1):23–32. Doi:10.31943/afiasi.v5i1.94

29. Sunguya BF, Zhu S, Mpembeni R, Huang J. Trends in prevalence and determinants of stunting in Tanzania: An analysis of Tanzania demographic health surveys (1991-2016). Nutr J 2019; 18(1): 1–13. Doi: 10.1186/s12937-019-0505-8

30. Astria Paramashanti B, Hadi H, Made Alit Gunawan I. Exclusive Breastfeeding is Not Related to Stunting in Children Aged 6-23 Months in Indonesia. Jurnal Gizi dan Dietetik Indonesia 2015;3(3):162–74. Doi: 10.21927/ijnd.2015.3(3).162-174

31. Soraya S, Ilham I, Hariyanto H. Environmental Sanitation Study on the Incidence of Stunting in the Working Area of Simpang Tuan Health Center, East Tanjung Jabung Regency. Jurnal Pembangunan Berkelanjutan 2022;5(2):98–114. Doi: 10.22437/jpb.v5i1.21200

32. He Z, Bishwajit G, Zou D, Yaya S, Cheng Z, Zhou Y. Burden of common childhood diseases in relation to improved water, sanitation, and hygiene (WASH) among Nigerian children. Int J Environ Res Public Health 2018;15(6). Doi: 10.3390/ijerph15061241