

ANALYSIS OF FAMILY SOCIO-ECONOMIC RISK FACTORS ON STUNTING INCIDENTS IN THE WORKING AREA OF THE TANJUNG SELOR PUBLIC HEALTH CENTER, BULUNGAN DISTRICT, NORTH KALIMANTAN

Sriastuti Momba ^{1*}, A. Arsunan Arsin ², Nur Nasry Noor ³,
Ridwan Amiruddin ⁴, Agus Bintara Birawida ⁵ and
Ridwan Mochtar Thaha ⁶

^{1,2,3,4} Department of Epidemiology, Faculty of Public Health,
Hasanuddin University, Makassar, Indonesia.

⁵ Department of Environmental Health, Faculty of Public Health,
Hasanuddin University, Makassar, Indonesia.

⁶ Department of Promotion and Behavioral Science, Faculty of Public Health,
Hasanuddin University, Makassar, Indonesia.

*Corresponding Author

DOI: [10.5281/zenodo.12607010](https://doi.org/10.5281/zenodo.12607010)

Abstract

Stunting is a child growth and development problem that is influenced by various factors. One indicator of growth is the height or body length of toddlers. Objective: This research aims to analyze family socio-economic risk factors for the incidence of stunting in the Tanjung Selor Community Health Center working area, Bulungan Regency. Method: The research design was a case control study, a total sample of 126 toddlers aged 24-59 months, consisting of 63 stunted respondents and 63 respondents who were not stunted. Data analysis used the STATA version 14 program with Odds Ratio and Multiple logistic regression tests. Results: Significant risk factors for stunting are the quality of drinking/cooking water (OR=11.19, 95%: CI: 2.844-44.081), and family income (OR=10.42, 95%: CI 2). Conclusion: ANC quality ≥ 4 times, maternal nutritional status/KEK, low birth weight, growth and development monitoring and maternal education are risk factors for stunting. The factors most at risk for stunting are the quality of drinking/cooking water and family income. It is necessary to examine raw drinking water sources that contain pathogenic germs, for drinking water, cooking, hand washing, toilets and other needs on a regular basis, ongoing research for microbiological examination of drinking water sources.

Keywords: Stunting; Nutrition; Risk Factors; Socioeconomic; Drinking Water Quality.

1. INTRODUCTION

The toddler years are a time of very rapid growth and development. Starting from the first day of pregnancy, the birth of the baby until the age of 2 years or what is known as the "golden period" or "critical period". The quality of children can be seen from their healthy and optimal growth and development. One of the growth indicators is the toddler's height or body length [1].

Globally in 2020, 149.2 million (144.4 to 154.2 million) children under 5 years of age, or 22.0% (21.3 to 22.7) of all children under five, were estimated to be stunted. The prevalence of child stunting in 2020 was very high in WHO Africa (31.7% [30.9 to 32.6]), Southeast Asia (30.1% [27.7 to 32.7]) and the Eastern Mediterranean Region (26.2% [24.5 to 27.9]), more than half (56.2%) of children suffering from wasting live in the Asian Region. The prevalence of stunting in Indonesia in 2020 is 31.8% [2]. GNR 2016 noted that the prevalence of stunting in Indonesia was ranked 108th out of 132 countries, the target for reducing the prevalence of stunting in Indonesia is based on the target (WHA) of 40% by 2025.

Research by Santosa [3] shows that a history of ANC visits is related to the incidence of stunting ($p = 0.044$). Research in three Latin American countries by Nohara [4] explains that ANC visits are one of the risk factors for stunting. ANC visits have a statistically significant and large effect on reducing malnutrition.

CED experienced by pregnant women can have an impact on the health of the mother and child, research by Wulandari [5] shows that there is a relationship between the nutritional status of mothers during pregnancy ($p = 0.003$), in line with by Nilfar [6] there is a significant relationship with CED in pregnant women with stunting, $OR = 4.85$ (95% CI; 2.70 – 8.72). The results of research on the history of LBW toddlers, Kinaya, et al (2022), $OR = 15.074$, are at risk of stunting compared to toddlers with normal LBW history, in line with research by Murti [7].

Research by Darmawan [8] shows that 87.2% of mothers under five children who regularly go to Posyandu experience stunting, with a p -value of 0.001, which means that there is a significant relationship between posyandu visits and the incidence of stunting. Hadi [9] research is different in that the history of posyandu visits for monitoring falls has a p -value = 0.845, meaning there is no significant relationship with history of visits to posyandu, in line with by Agustina [10] p -value (1,000) >0.05 , there is no relationship with child weighing. with stunting incidents

Maternal education, urban vs rural residence, wealth index and birth weight have a significant impact on stunting or child malnutrition [11]. In line with research by Tesfaye [12] that parental education has a significant relationship with cases of stunting $AOR=3, 39$ (95% CI: (1.12 - 5.11)

Parental income on the incidence of stunting, research by Maulida [13] p -value 0.018, meaning there is a significant relationship between parental income and the incidence of stunting. In line with by Gaston [11], the possibility of stunting increases with a higher level of poverty compared to those from rich families.

Drinking water consumed that does not meet the requirements can cause infection due to the presence of pathogenic germs that live and grow in polluted water. Research by Sukmawati [14], at a significance level of 0.05, there is a relationship between the quality of drinking water and the incidence of stunting. Research by Haq [15] shows that water quality is a significant factor contributing to child malnutrition based on stunting in flood-affected areas in Pakistan, as well as in South Africa by Bridgman [16] Access to protected drinking water also improves the relationship between household participation in the program social safety net and reduction in stunting $p=0.009$ [17].

2. METHODS

2.1 Types and Research Design

This research is a type of quantitative analytical research with a case control study or case control research design. It will be carried out in the work area of the Tanjung Selor Community Health Center, Bulungan Regency in 2023. The sampling technique used is systematic random sampling, namely selecting samples from a population where each member of the population has the same opportunity and all possible combinations are selected. The sample in this study was divided into two groups: case samples of toddlers who were stunted and control samples of toddlers who were not stunted, based on inclusion and exclusion criteria.

2.2 Ethical Aspects

This research is based on ethics obtained from the ethics committee of the Faculty of Public Health, Hasanuddin University. All subjects provided informed consent before being given treatment

2.3 Sampling Technique

The sample size in this study was 126 people with a ratio of 1:1. In total there were 63 cases and 63 control samples. The criteria for a "case" is a mother/guardian who has a child aged 24-59 months who is stunted. The "Control" group is mothers/guardians who have children aged 24-59 months who do not experience stunting recorded at the Tanjung Selor Community Health Center

2.4 Data Analysis

Data were analyzed using the Stata program version 14. The relationship and magnitude of risk factors between the dependent and independent variables were analyzed using the Odds Ratio (OR) test. The multivariate analysis used is a logistic regression test with a confidence level of 95% ($\alpha=0.05$) [18].

3. RESULT

Table 1: Distribution of Respondent Characteristics in the Tanjung Selor Public Health Center Working Area, Bulungan Regency in 2023

Respondent Characteristics	Stunting Incident				Total	
	Case		Control			
	n=63	%	n=63	%	n=126	%
Child Age 24-59 Months						
24-36 Months	36	57,14	34	53,97	70	55,56
37-59 Months	27	42,86	29	46,03	56	44,44
Mother's Age						
≤ 19	0	0	0	0	0	0
20 – 29	29	46,03	32	50,79	61	48,41
≥30	34	53,97	31	49,20	65	51,58
Mother's Education						
Finished elementary school	6	7,94	2	3,17	8	6,34
Completed junior high school/MTS	21	33,33	17	26,98	38	30,16
Finished high school/MA	32	50,79	24	38,09	56	44,44
Completed Diploma/PT/S1/S2	4	6,35	19	30,16	23	18,25
Mother's Job						
Housewife	55	87,30	43	68,25	98	77,77
Civil servants	1	1,59	12	19,05	13	10,32
Self-employed	5	7,94	5	7,94	10	7,94
Honorary	2	3,17	3	4,76	5	3,97

Source: Primary Data, 2024

Based on table 1, it shows the distribution of respondents in the largest group of children aged 24-36 months (57.14%), the mother's age in the case group ≥30 was (53.97%), based on the highest level of high school/MA education (44.44%) , most respondents' jobs were housewives (77.77%).

Table 2: Bivariate analysis of risk factor variables for stunting incidents in the Tanjung Selor Community Health Center Area, Bulungan Regency in 2023

Variable	Stunting Incident				Total	
	Case		Control		OR	95%CI (LL-UL)
	n=63	(%)	n=63	(%)		
ANC quality \geq 4 times						
High Risk	54	70,97	41	43,16	3,21	1,252- 8,750*
Low Risk	9	29,03	22	56,84		
Mother's Nutritional Status/KEK						
High Risk	52	68,57	39	42,86	2,90	1,190-7,356*
Low Risk	11	31,43	24	57,14		
LBW						
High Risk	58	81,48	41	41,41	6,22	2,045-22,478*
Low Risk	5	18,52	22	58,59		
Growth Monitoring						
High Risk	49	65,00	37	43,02	2,45	1,059-5,815*
Low Risk	14	35,00	26	56,98		
Mother's Education						
High Risk	44	65,45	27	38,03	3,08	1,395-6,886*
Low Risk	19	34,55	36	61,97		
Family Income						
High Risk	42	71,63	10	19,23	10,6	4,204-27,641*
Low Risk	21	28,38	53	80,77		
Quality of Drinking and Cooking						
High Risk	23	60,00	3	11,54	11,5	3,108-62,613*
Low Risk	40	40,00	60	88,46		

Source: Primary Data, 2024

Table 2 shows that the ANC quality variable is \geq 4 times the value (COR 3.21, CI: 95%: 1.252- 8.750), the nutritional status of the KEK mother with the value (COR 2.90, CI: 1.190-7.356), body weight low birth rate with value (COR 6.22, CI 95%: 2.045-22.478), growth and development monitoring with value (COR 2.45, CI 95%: 1.059-5.815), maternal education with value (COR 3.08, CI 95%: 1.395-6.886), family income with value (COR 10.6, CI 95%: 4.204-27.641), and drinking and cooking water quality variables with value (COR 11.5, CI 95%: 3.108-62.613).

Table 3: Multivariate analysis of risk factors for stunting in the Tanjung Selor Community Health Center Area, Bulungan Regency Year 2023

Variable	AOR	(CI 95%LL-UL)
ANC quality > 4 times	1,09	(0,330-3,618)
Mother's Nutritional Status/KEK	1,41	(0,429-4,640)
Low birth weight	2,4	(0,562-10,286)
Growth Monitoring	1,82	(0,602-5,524)
Mother's Education	1,24	(0,438-3,520)
Family Income	6,58	(2,371-18,296)
Quality of Drinking and Cooking Water	14,7	(3,287-66,422)

Table 3 shows that the most dominant variable as a risk factor for stunting incidents in the Tanjung Selor Health Center area, Tanjung Selor District, Bulungan Regency is the quality of drinking water with an Adjusted Odds Ratio (AOR) value of 14.7 and a 95% confidence interval (CI) of 3.287- 66,422, indicating the risk of stunting is 14.7 times higher.

Table 4: Final multivariate analysis

Variable	AOR	Coeff	(CI 95%LL-UL)
Family Income	10,42	4,858339	(4,183- 25,987)
Drinking/Cooking Water Quality	11,19	2,415742	(2,844-44,081)
Constanta		-1.318961	

After getting the coefficient values, a logistic regression equation is carried out based on the final model to calculate the probability value using the following formula.

$$Y = \text{Constanta} + \text{Coef}(\text{family income} * 1 + \text{Coef}(\text{quality of drinking and cooking water}) * 1$$

$$Y = -1.318961 + 4.858339 * 1 + 2.415742 * 1 = 3.441$$

After getting the Y value entered in the formula to calculate the probability value, the result is as follows $P = 1 / (1 + \exp(-y)) = 96.8\%$. Based on this value, it can be said that the probability of stunting due to the influence of the respondent's low income and inadequate drinking water quality is 96.8%.

4. RESULT

Risk Factors for Maternal ANC Quality

Table 2 of the case sample shows that the majority of mothers with poor quality ANC (ANC < 4 and not served 10 T) had more cases of stunting (70.97%), while mothers with ANC quality ≥ 4 times the low risk category (56.84%). In the logistic regression statistical test, maternal ANC quality ≥ 4 times was a risk factor for stunting with a value of (OR 3.2, CI: 95%, 252-8,750).

The quality of mothers with ANC is not good, this can be seen in the KMS book and adjusted to the mother's ANC register book. It was found that there were still many respondents who did not carry out maternal ANC examinations which were not of good quality or did not meet standards, which would have an impact on fetal growth and impact on LBW, risk of death and stunting.

This research is in line with research conducted by Dinamara [19] which showed that mothers who had stunting toddlers (14%) had poor pregnancy checks (35.3%) while mothers who had non-stunted toddlers had good pregnancy checks (26.7%) less pregnancy checks (23.3%) p-value = 0.001 (p < 0.05) there is a relationship between the determinants of pregnancy checks (ANC) and the incidence of stunting p-value 0.014.

This research is also supported by research by Sumiati [20] that there is a relationship between a history of ANC visits and the incidence of stunting. More attention needs to be paid to prevention methods before and after pregnancy to prevent LBW.

The results of this research are in line with research by Darmawan [8] that ANC visits and the incidence of stunting show a statistical test value of $P = 0.044$ (p, 0.05) that there is a relationship between the history of ANC visits and the incidence of stunting. During pregnancy, the fetus will experience very rapid growth and development so that the quality of the mother's food, health and lifestyle can affect the fetus she is carrying [9].

Poor quality ANC increases the risk of various health and nutritional problems in mothers and babies, which contributes to the incidence of stunting, an important step in strategies to prevent stunting and ensure optimal health for mothers and children.

Risk Factors for Maternal Nutritional Status/CED

Table 2 shows that the nutritional status of mothers/KEK is quite high in cases of stunting (68.57%), while the nutritional status of mothers/KEK is in the low risk category (57.14%). In the logistic regression statistical test, maternal nutritional status/CED was a risk factor for stunting with an OR value of 2.90, 95% CI: 1.190–7.356. KEK is related to the family's ability to provide good food for the mother during pregnancy, due to economic limitations or insufficient income to meet the mother's nutritional needs, this problem has implications for inadequate nutritional intake when the mother is pregnant, which has an impact on mothers with KEK

Research conducted by Trisnawati [21] showed that there was a relationship between the history of CED in pregnant women and the incidence of stunting in children under five aged 12-59 months, p value = 0.035 (<0.05), in line with research by Oktifasari [22] there was a significant relationship between history and KEK of pregnant women on TB/U under five was found to be p=0.036 (<0.05).

Research conducted by Ruaida [23] from the results of the Chi Square test showed that the risk value for stunting in toddlers was 4.85 times > for mothers who experienced CED during pregnancy and there was a statistically significant relationship. This research is also in line with Alice [24], the Chi-Square (Continuity Correction) statistical test obtained a value of $\chi^2 = 13.731$ with p= 0.000 (<0.05). There is a significant relationship between a history of KEK and the incidence of stunting.

Research conducted by Eka [25] obtained results that were different or not in line with this research, the results of the Fisher's Exact Test showed that there was no relationship between KEK in pregnant women and the incidence of stunting in toddlers 24-59 months.

Chronic energy deficiency (CED) is a condition where the mother suffers from a chronic lack of food which results in health problems for the mother. CED can occur in women of childbearing age (WUS) and in pregnant women. A person is said to be at risk of CED if LILA < 23.5 cm.

Risk Factors for Low Birth Weight

Table 2. The percentage of LBW (<2500) is highest in stunting cases (81.48%), while LBW is in the low risk category (58.59%). In the statistical test results, LBW is a significant risk factor for the incidence of stunting, the OR value is 6.22, 95% CI: 2.045-22.478, where LBW plays a role in the occurrence of stunting 6.22 times compared to normal LBW.

In research conducted by Miranti [26], LBW contributed to the incidence of stunting by 5,294 times when compared with a history of normal LBW, babies born LBW will experience obstacles in their growth and development, possibly decreasing intellectual function. In addition, babies are more susceptible to infection and hypothermia occurs.

This research is in line with that conducted by Ilmi [27] that a history of LBW is a risk factor which is the main determinant of stunting in children aged 6-24 months with an OR value of 6.075, 95% CI 1.145-32.219 indicating that children who have a history of LBW have a 6.075 times risk of experiencing stunting compared to children who have normal BBL.

The results of this study are not in line with research conducted by Sukmawati [14] which showed that the number of children under five who were LBW and experienced stunting was 3.8% (2 children) and normal BBL experienced stunting of 96.2% (50 children) and the test results The statistical value obtained was $p=0.47$ (>0.05), meaning there was no relationship between LBW and stunting. Babies with LBW are an important indicator of public health which reflects the lack of maternal nutritional intake that occurs for a long time, low socio-economic conditions often have limited access to nutritious food and adequate health services, which has a negative impact on growth.

Risk Factors for Growth and Development Monitoring

Table 2 shows that the majority of children do not regularly monitor their growth and development, many in cases of stunting (65.00%), while monitoring their growth and development is in the low risk category (56.98%) and the results of statistical tests show that children who do not routinely monitor their growth and development show that that it is a risk factor for stunting with an OR value of 2.420, 95% CI: 0.605 - 9.683) this shows that respondents do not regularly go to the posyandu to monitor growth and development from looking at the KMS book for toddlers, growth problems can be detected as early as possible with routine going to the posyandu, so they don't fall into chronic growth problems or stunting.

Research is also in line with that conducted by Hadi [9] that children under five who experience stunting are > found in respondents who are less active in visiting posyandu (36.6%) statistical test p value = 0.845 α value (0.05), meaning there are no significant relationship between a history of visits to the posyandu for monitoring falls and the incidence of stunting. The results of this study are not in line by Agustina [10] the weight weighing variable for monitoring growth and development $p=(1,000) >0.05$, there is no relationship between children's weighing and the incidence of stunting.

Toddlers who regularly visit the posyandu with ≤ 8 visits in a period of 1 year and experience stunting, this factor is caused by toddlers who come to the posyandu, but only get weighed and do not receive additional services such as nutritional consultations and counseling. Regular monitoring allows early identification of growth problems, such as stunted growth or weight loss, without regular monitoring, early signs of stunting may not be detected until the problem is already serious and more difficult to intervene.

Risk Factors: Maternal Education

Research results in table 2. Respondents with low levels of maternal education were most likely to have stunting cases (65.45%), while maternal education was in the low risk category (61.97%). These results show that maternal education is a significant risk factor for the incidence of stunting with an OR value of 3.08, 95% CI: 1.395-6.886. This shows that the mother's education is low, Research conducted by Lahming [28] shows that 63.2% of the education of housewives with stunted toddlers is at junior high school level. Education for housewives under five is expected to be able to develop themselves and their abilities inside and outside of education which can be utilized optimally for their survival. Education can influence attitudes in making decisions and taking action to change a healthier lifestyle. This research is in line with that carried out by Rosy [24] on maternal education. The results showed that there was a significant relationship between the level of maternal education and the incidence of stunting with a p-value of 0.014. This research is in line with that conducted by Tesfaye

[12] which revealed that lack of maternal education, AOR = 3.39, CI 95%: 1.12, 5.11, is an independent predictor of the incidence of stunting. This research is in line with what was found by Alice [24] regarding maternal education. The results showed that there was a significant relationship between maternal education level and the incidence of stunting with a value of $p=0.014$. Research by Vollmer [29] which evaluated the same study topic in India, Ethiopia, Tanzania, Uganda and Vietnam also found similar results that the mother's education level was one of the determining factors for stunting in children. The results of this study are not in line with what was found by Oktafisari [22] that maternal education did not have a significant influence (p -value <0.20 , $t<1.96$, $P>0.05$). As well as different findings obtained by Maulida [13] based on statistical tests (Chi-Square), it is known that the p -value is 0.121 (> 0.05), that there is no significant relationship between parental education and the incidence of stunting. Overall, education plays an important role in preventing stunting because it influences knowledge, attitudes and behavior related to children's nutrition and health. Efforts to increase education, especially health and nutrition education, among mothers can help reduce the prevalence of stunting.

Family Income Risk Factors

Table 2 shows that the percentage of low income is highest in stunting cases (71.63%), while family income in the low risk category is in controls (80.77%). In the statistical test results, income is less risky and has a significant impact on the incidence of stunting with an OR value of 10.6 95% CI 4.204-27.641. In this study, the majority of respondents had incomes below the minimum wage. The low income of respondents was related to the purchasing power of varied food ingredients and good nutrition for children's growth. This research is in line with research by Maulida [13] based on statistical tests (Chi-Square), it is known that the p -value = 0.018 (p -value < 0.05), so it can be concluded that there is a significant relationship between parental income and stunting incident.

The results of this research are also in line with the research by Nurmawati [30], high income levels and stunting occur (16.8%), but not stunting (34.8%) and low income levels occur (25.8%), no stunting (22.6%). The Chi-Square test results have a value of $P = 0.000 < 0.05$, meaning that there is a relationship between income level and stunting. Income level will determine the type and variety of food that the family will buy. The results of this study are not in line with the research of Dewi [31] that family income has no significant relationship with stunting in the urban area of Surakarta City, p -value 0.152. In contrast to research by Dewi [32], based on the results of Chi-Square analysis, it shows that income has no relationship with stunting with a p value = 0.416. Even though income is not related to stunting, the income of stunted families is more below the minimum wage compared to the non-stunted group.

Risk Factors for Drinking and Cooking Water Quality

The research results in table 2. Shows the highest percentage of case samples with drinking water quality not meeting the percentage requirements (60.00%), while drinking water quality meets the requirements for the low risk category in controls (88.46%) in the high risk statistical test. significant for the incidence of stunting, the OR value is 11.5, CI 95%: 3.108-62.613, meaning there is a high risk of stunting. In this study, the majority of respondents did not meet the requirements for the quality of the drinking water used and did not meet the physical requirements, namely not cloudy, tasteless, the water was contaminated with pathogenic bacteria.

The results of this study are in line with those found by Pradani [33] showing that the statistical test of drinking water quality found $p = 0.001$ (p value < 0.05), there is a significant relationship between drinking water quality and the incidence of stunting, and is a risk factor for stunting OR 6,094. In line with research by Hadi [9], bivariate analysis shows that there is a relationship between drinking water quality with a value of $p = (0.005)$ (OR = 4.875, CI 95%: 1.657-14.340) meaning that drinking water quality that does not meet the requirements has a 4.875 times higher risk. greater risk of experiencing stunting compared to water quality that meets the requirements. This research is in line with that carried out by Nurhayati [34] based on the results of statistical tests showing that the quality of drinking water was found to be $p = 0.001$ (p value < 0.05), meaning that there is a significant relationship between drinking water quality and the incidence of stunting, and is a risk factor. stunting OR value 6.094.

The results of this study are not in line with research conducted by Ilmi [27] showing that access to clean water is an insignificant risk factor for stunting in children aged 6-24 months. The quality of drinking and cooking that does not meet health requirements can cause various health problems that affect children's growth and development and contribute to stunting.

5. CONCLUSION

Quality of maternal ANC < 4 times, maternal nutritional status / KEK, low birth weight, growth and development monitoring, maternal education, parental income, quality of drinking and cooking water are risk factors for increasing the incidence of stunting in the Tanjung Selor Community Health Center working area, Bulungan Regency. Based on multivariate logistic analysis, the most dominant risk factor for stunting is the very risky drinking/cooking water quality variable. Carrying out health promotion and education evenly, empowering the community through the STBM program by involving related sectors in efforts to improve the quality of drinking water that meets environmental health requirements in breaking the chain of infection due to water that does not meet the requirements.

Reference

- 1) Elisaria, E., Mrema, J., Bogale, T., Segafredo, G., & Festo, C. (2021). Effectiveness of integrated nutrition interventions on childhood stunting: a quasi-experimental evaluation design. *BMC Nutrition*, Vol 7(17). Pp.22-30. <https://doi.org/10.1186/s40795-021-00421-7>
- 2) World Health Organization. (2022). *SDGs Sustainable Development Goals*. <http://apps.who.int/bookorders>
- 3) Santosa, A., Arif, E. N., & Ghoni, D. A. (2022). Effect of maternal and child factors on stunting: partial least squares structural equation modeling. *Clinical and Experimental Pediatrics*, Vol 65(2), pp.90–97. <https://doi.org/10.3345/cep.2021.00094>
- 4) Nohara F. Ramirez, Luis F. Gamboa, Arjun S. Bedi, & Robert Sparrow. (2018). *Malnutrisi Anak dan Perawatan Antenatal*. Nigeria. *J Public Health*. Vol 4(1):pp.408. doi: 10.4081/jphr.2015.408
- 5) Wulandari, F. C. ., & Susanti. (2021). The relationship between maternal nutritional status during pregnancy and the incidence of stunting in toddlers aged 0-24 months at the Kaligesing Purworejo Community Health Center. *Journal of Health Communication*, Vol 12(2). Pp.27-33. <https://doi.org/10.56772/jkk.v12i2.198>
- 6) Nilfar Ruaida, & Octovina Soumokil. (2018). *Hubungan Status KEK Ibu Hamil dan BBLR dengan Kejadian Stunting*. *Integrated Health*. Vol 9(2). Pp.54-60. DOI 10.32695/JKT.V2I9.12

- 7) Murti, F. C., Suryati, S., & Oktavianto, E. (2020). The Relationship Of Low Birth Weight (Lbw) With The Incident Of Stunting In Toddler Ages 2-5 Years In Umbulrejo Village, Ponjong District, Gunung Kidul District. *Nursing Health Scientific Journal*, Vol 16(2), 52-62. <https://doi.org/10.26753/jikk.v16i2.419>
- 8) Darmawan, A., Reski, R., & Andriani, R. (2022). ANC visits, posyandu and immunizations with the incidence of stunting among toddlers in Central Buton Regency. *AcTion: Aceh Nutrition Journal*, Vol 7(1), pp.33-42. <https://doi.org/10.30867/action.v7i1.469>
- 9) Hadi, Z., Anwary, A. Z., & Asrinawaty, A. (2022). The incidence of toddler stunting is seen from the aspects of Posyandu visits and exclusive breastfeeding behavior. *Baiturrahim Jambi Academic Journal*, Vol 11(1), 1-10. <https://doi.org/10.36565/jab.v11i1.389>
- 10) Agustina, R., Tri, ;, Utami, N., & Asriwati, (2020). The Relationship Of Nutritional Conscious Family Behavior With The Incident Of Toddler Stunting And Program Evaluation. *Priority Nursing Journal*, Vol 3(2). Pp.42-52. <https://doi.org/10.34012/jukep.v3i2.948>
- 11) Gaston, R. T., Habyarimana, F., & Ramroop, S. (2022). Joint modelling of anaemia and stunting in children less than five years of age in Lesotho: a cross-sectional case study. *BMC Public Health*, Vol 22(1). Pp.1-11. <https://doi.org/10.1186/s12889-022-12690-3>
- 12) Tesfaye, A., & Egata, G. (2022). Stunting and associated factors among children aged 6–59 months from productive safety net program beneficiary and non-beneficiary households in Meta District, East Hararghe zone, Eastern Ethiopia: a comparative cross-sectional study. *Journal of Health, Population and Nutrition*, 41(1). Pp.220-229. <https://doi.org/10.1186/s41043-022-00291-0>
- 13) Maulida, Studi, P., & Keperawatan, S. (2022). The Relationship Of Family Characteristics And Nutritional Status With The Incident Of Stunting In Children Town In The Working Area Of The Darul Aman Health Center, East Aceh District, 2021. *Getsempena Health Science Journal* Vol. 1 (1). Pp.22-30. <https://doi.org/10.46244/ghsj.v1i1.1705>
- 14) Sukmawati, S., Fanny, L., Mas'ud and Sirajuddin, H. (2023). The Relationship Of Lbw History And Stunting In Toddler Children In Boribellaya Village, Turikale District. *Food Nutrition Media* Vol 30(2). Pp.27-34. <https://doi.org/10.32382/mgp.v30i2.279>
- 15) Haq, I. U., Mehmood, Z., Afzal, T., Khan, N., Ahmed, B., Nawsherwan, Ali, L., Khan, A., Muhammad, J., Khan, E. A., Khan, J., Zakki, S. A., Xu, J., & Shu, Y. (2021). Prevalence and determinants of stunting among preschool and school-going children in the flood-affected areas of Pakistan. *Brazilian Journal of Biology = Revista Brasileira de Biologia*, Vol 82(1), pp.e249971. <https://doi.org/10.1590/1519-6984.249971>
- 16) Bridgman, G., & von Fintel, D. (2022). Stunting, double orphanhood and unequal access to public services in democratic South Africa. *Economics and Human Biology*, Vol 44(1). Pp.36-42. <https://doi.org/10.1016/j.ehb.2021.101076>
- 17) Kabalo, B. Y., & Lindtjörn, B. (2022). Seasonality and predictors of childhood stunting and wasting in drought-prone areas in Ethiopia: a cohort study. *BMJ Open*, 12(11). Pp.331-340. <https://doi.org/10.1136/bmjopen-2021-060692>
- 18) Stang. (2018). *Practical Ways to Determine Statistical Tests in Research Health and Medicine* Edition 2. Jakarta: Mitra Wacana Media
- 19) Dinamara, N. (2021). Determinants of Stunting among Baduta in the Ternate City Health Service Working Area. *Indonesian Community Nutrition Journal (The Journal of Indonesian Community Nutrition)*, Vol 10(2). Pp.44.-53. <https://doi.org/10.30597/jgmi.v10i2.18439>
- 20) Sumiati, Arsin, A. A., & Syafar, M. (2020). Determinants of stunting in children under five years of age in the Bone regency. *Enfermeria Clinica*, Vol 30(1), pp.371–374. <https://doi.org/10.1016/j.enfcli.2019.10.103>
- 21) Trisnawati, E., Yani Veronica, S., Isnaini, M., Wulandari, E. T. (2022). The Relationship Of Chronic Energy Deficiency (Ced) And The Height Of Pregnant Women With The Incident Of Stunting In Toddler Children Aged 12-59 Months In The Working Area Of The Gunung Sari Puskesmas, Pesawaran District, 2021. *Aisyah Maternity Journal*. Vol 3(3). Pp.12-20. <https://doi.org/10.30604/jaman.v3i3.731>

- 22) Oktifasari, D. A., Salsabiila, D. T., Febriyanti, D., Dewi, D. T. R., Fatmawati, R. A., Sari, Y., ... & Ariesanti, K. (2022). Analysis Of The Relationship Of The History Of Chronic Energy Deficiency Of Pregnant Women On Stunting Toddler In Popongan, Karanganyar District. *Avicenna: Journal of Health Research*, Vol 5(2).pp.112-119. <https://doi.org/10.36419/avicenna.v5i2.688>
- 23) Ruaida, N. (2018). The First 1000 Days of Life Movement to Prevent Stunting (Short Nutrition) in Indonesia. *Global Health Science*, Vol 3(2), pp.139-151. <http://dx.doi.org/10.33846/ghs.v3i2.245>
- 24) Alice, R. (2022). Mother's Educational Level and Parenting Patterns Are Associated with the Incident of Stunting in Toddlers. *Forikes Voice Health Research Journal*, Vol 13 (3). Pp.2086-3098. <http://dx.doi.org/10.33846/sf13321>
- 25) Eka, M, F. Eka Sari, and Yulyani, V. (2021). The Relationship Of Water And Sanitation With Stunting Incidents In The Working Area Of The Candipuro Puskesmas South Lampung District, 2021. *IJOHM*. Vol 2(1). Pp.11-22. <https://ijohm.rcipublisher.org/index.php/ijohm/article/view/101>
- 26) Miranti, Mutiarasari, D., Arsin, A. A., Hadju, V., Mallongi, A., Nur, R., Amri, I., Haruni, H., Wahyuni, R. D., Rahma, & Faris, A. (2020). Determinants of the incidence of stunting in the working area of Kinovaro Sigi Health Center. *Enfermeria Clinica*, Vol 30(2), pp.246–252. <https://doi.org/10.1016/j.enfcli.2019.10.077>
- 27) Ilmi, I., N., Zulkifli, A., Arsin, A. A., Ansariadi, Hidayanty, H., & Riskiyani, S. (2023). Determinants of Stunting in Children Aged 6-24 Months at Pambusuang Health Centre Working Area, Polewali Mandar Regency, Indonesia. *National Journal of Community Medicine*, Vol 14(12), pp.842–848. <https://doi.org/10.55489/njcm.141220233435>
- 28) Lahming, B. M. Hasmyati, & Arsin, A. A. (2023). Risk Assessment and Control of Stunting in Makassar City, Indonesia. *Advances in Research*, Vol 24(6), pp.21–29. <https://doi.org/10.9734/air/2023/v24i6980>
- 29) Vollmer, S., Bommer, C., Krishna, A., Harttgen, K., & Subramanian, S. V. (2017). The association of parental education with childhood undernutrition in low- and middle-income countries: Comparing the role of paternal and maternal education. *International Journal of Epidemiology*, Vol 46(1), pp.312–323. <https://doi.org/10.1093/ije/dyw133>
- 30) Nurmawati, Daniel, G., Netti, E. B. (2021). Risk Factor Analysis of Stunting in Toddlers in Ragemanunggal Village, Setu II Bekasi Public Health Center Working Area. *Jurnal Ilmiah Keperawatan (Scientific Journal of Nursing)*, Vol 9(4), pp.230-235. <https://doi.org/10.33023/jikep.v9i4.1611>
- 31) Dewi, Y. L. R., Shabrina, A., Ayusari, A. A., Wiboworini, B., Sudarsono, J., Handayani, S. S., & Rahayu, D. (2022). Prevalence and determinants of stunting among primary school girls in urban Surakarta City, Indonesia. *Prevalence*, Vol 62(07). Pp.45-52. <https://www.researchgate.net/publication/370496595>
- 32) Dewi, N. T., & Widari, D. (2018). The Relationship between Low Birth Weight and Infectious Diseases with the Incident of Stunting in Infants in Maron Kidul Village, Maron District, Probolinggo District. *Amerta Nutr*, Vol 2(4). Pp.24–33. <https://doi.org/10.2473/amnt.v2i4.2018.373-381>
- 33) Pradani PH, F., & Azinar, M. (2024). Incidence of Stunting in Toddlers Aged 24-59 Months at Bandarharjo Community Health Center. *HIGEIA (Journal of Public Health Research and Development)*, Vol 7(4), pp.635-646. <https://doi.org/10.15294/higeia/v5i2/39818>
- 34) Nurhayati, A., Wahyuniar, L., Suparman, R., & Badriah, D. L. (2022). The Relationship Between Drinking Water, Sanitation And History Of Diarrhea Factors And Stunting In Adult Children In Rancakalong District, Sumedang District 2021. *Journal of Health Research Science*, Vol 2(2), pp.104–114. <https://doi.org/10.34305/jhrs.v2i02.585>