The Relationship Between Household Drinking Water Quality and The Incidence of Stunting

Deli Syaputri[1],Theodorus Teddy Bambang Soedjadi[2], Samuel Marganda Halomoan Manalu[3],Risnawati Tanjung[4], Devi Rosana[5]

[1,2,3,4,5] Politeknik Kesehatan Kementerian Kesehatan Medan, Jl. Jamin Ginting Km. 13.5 Kel. Lau Cih Medan-Tuntungan
Email corespondensi : delisyaputri1989@gmail.com

Track Record Article

Accepted: 3 February 2023
Revised: 3 March 2023
Published: 20 March 2023

How to cite : Syaputri , Deli, dkk. (2023). The Relationship Between Household Drinking Water Quality and The Incidence of Stunting. *Contagion : Scientific Periodical of Public Health and Coastal Health*, 5(1), 1–11.

Abstract

Unhealthy housing conditions will hurt human health, one of which is ARI. Based on data from the Stabat Health Center, ARI is among the top 10 diseases. Based on 2019 data, there were 1572 cases; the increase in cases occurred from 2020 to 1692, with 206 cases in Sidomulyo Village. Moreover, the physical condition of the houses in Sidomulyo still needs to meet the requirements of a healthy home. This study aimed to determine the relationship between household drinking water quality and the incidence of stunting in children aged 6-59. Observational research with a case-control design on children aged 6-59 months in the Talun Kenas Health Center Area, Deli Serdang Regency. The sampling technique was carried out by consecutive sampling with a total sample of 42 subjects in each group. Stunting was categorized based on TB/U score < -2 SD according to KEPMENKES RI anthropometric standard table. Drinking water quality was tested using a sanitarian kit—bivariate analysis using the Chi-Square test by looking at the Odds Ratio (OR). The results of the bivariate analysis show that the quality of household drinking water is associated with stunting in children aged 6-59 months (p=0.004; OR=4.144), meaning that the quality of drinking water that does not meet the requirements increases the incidence of stunting in children aged 6-59 months. This study concludes a significant relationship between the quality of household drinking water and the incidence of stunting in children aged 6-59 months.

Keyword: Drinking, Stunting, Toddler, Water Quality.

INTRODUCTION

Stunting is an indicator of shortness, measured using the formula height-for-age (TB/U) Length-for-age (PB/U), which indicates a chronic nutritional problem that is the result of long-standing conditions, such as poverty, hazardous living behaviors, and inadequate parenting/feeding from birth (Galgamuwa et al., 2017). Stunting indicates a community's prosperity, health, and income. Diet, parenthood and health factors acquired by mothers and their children significantly influence their future health and well-being (Rahmad, 2016). The effects of stunting on children's economy, intelligence, and quality of life are significant. Short children are more likely to become adults with less education and increased susceptibility to infectious diseases .

According to the Fundamental Health Research (Riskesdas) report, the prevalence of stunting in Indonesia increased from 2016 to 2018, from 27.5% in 2016 to 29.6% in 2017 to 30.8% in 2018 (Kementerian Kesehatan RI, 2018). According to World Health Organization (WHO) standards, the stunting rate in Indonesia, which ranges from 30 to 39%, constitutes a national public health issue that requires immediate attention (Rachmi et al., 2019).

In 2013, the prevalence of stunting in North Sumatra reached 40 percent and decreased to 32 percent (very short 13.2 percent and short 19.9 percent). This number is still low compared to WHO standards, which classify a region as acceptable if the prevalence of stunting is below 20% (WHO, 2009)

There are direct causal factors and indirect causal factors that cause malnutrition. Direct causes of stunting include toddler nutrition, the nutritional status of expectant women, and infectious diseases (Adzura, 2021); (Novianti, 2020). In contrast, indirect causes include the physical quality of drinking water, drinking water sources, latrine ownership, and hygiene, specifically hand-washing practices (Uliyanti, 2017). Waste management can contribute to additional environmental risks (Novianti, 2020). These conditions must be met to reduce the incidence of malnutrition and morbidity, one of which is stunting. This nutritional problem can be caused by inadequate environmental sanitation (Ainy et al., 2021); (Emryssyah, 2021).

As a result of a lack of health knowledge, poor environmental sanitation, such as potable water sanitation and population density, also contribute to childhood stunting. According to research (Safitri, 2020), there is a significant relationship between domestic sanitation and the incidence of stunting. Consequently, environmental sanitation has a significant impact on the prevalence of stunting (Febry et al., 2022); (Salman et al., 2017).

Components of environmental sanitation, such as hygienic behavior and sources of potable water, have a greater impact on the development of children under the age of five than infectious diseases, such as gastroenteritis. The 0.1-0.6 SD point decrease in TB/U anthropometric measurements is proportional to the quality of sanitation, clean water, and hygiene (Yuliani, 2019). Children under the age of five can be stunted due to poor drinking water sanitation and a lack of behavioral hygiene, which can cause digestive disorders that result in nutrients for growth being converted into the body's resistance to combating TB/U. infections (Schmidt, 2014).

As children under the age of five are still susceptible to infectious diseases, environmental sanitation affects their growth and development (Aprizah, 2021). Continued exposure of a toddler to human and animal excrement can result in chronic bacterial

infections, which can be caused by inadequate water and environmental sanitation, which reduces the body's ability to assimilate nutrients. Inadequate environmental sanitation causes digestive tract disorders, which divert toddlers' energy from growth to battling infections (Izzati, 2016); (Checkley, 2018).

Water used for residential purposes, such as potable water, must meet international, national, and local health requirements. The purity of drinking water in Indonesia must satisfy the requirements outlined in Permenkes RI No. 492/MENKES/PER/IV/2010 (Permenkes RI, 2010). Each component must meet safe drinking water's physical, chemical, and biological requirements. Temperature 3, odorless ness, colorlessness, and tastelessness are the physical characteristics. The pH range for chemical requirement parameters is between 6.5 and 8.5. While the microbiological parameters are total coliform bacteria and E. coli with a permissible threshold value of 0 per 100 ml of sample, the microbiological parameters are total coliform bacteria and E. coli. If coliform is detected in water, it indicates the presence of toxigenic microorganisms that are detrimental to human health (Mediani, Henny, 2020).

A preliminary survey conducted in the community of the Talun Kenas Health Center's working area in Deli Serdang Regency revealed poor environmental conditions, such as the lack of sanitation or clean water facilities and the poor quality of clean water, which makes children susceptible to infectious diseases that can lead to stunting in toddlers.

METHODS

Observational research is used; observational research is conducted without interacting with the research subject. This study conducted an analytic survey on the risk factors for stunting, specifically the purity of household potable water as the independent variable and the incidence of stunting in children aged 6-59 months as the dependent variable. This study's data were analyzed using analytical correlation. Correlation research is the study or examination of the relationship between two variables in a situation or group of subjects to determine the relationship between one symptom and another or one variable with another variable. Case-control methodology was utilized in this study. Case-control research is an observational, analytic epidemiological study investigating the association between certain effects (diseases or health conditions) and specific risk factors. The case-control research design can be utilized to evaluate the role of disease risk factors.

RESULTS

Table 1 Frequency Distribution of Respondent Characteristics

	Stunting		Normal	
Respondent Characteristics	**n**	**%**	**n**	**%**
Age Respondents:				
16-25 yearsold	14	33,3	9	21,4
26-35 yearsold	17	40,5	19	45,2
36-45 yearsold	7	16,7	10	23,8
46-55 years old	4	9,5	4	9,5
Education Respondents:				
Never School	3	7,1	1	2,4
Graduated from elementary school	5	11,9	5	11,9
Middle school graduate	15	35,7	15	35,7
Graduated from high school	16	38,1	15	35,7
Graduated Diploma	1	2,4	3	7,1
Graduate	2	4,8	3	7,1
Respondent's Occupation:				
Does not work	7	16,7	7	16,7
Farmers/Laborers/Fishermen	15	35,7	15	35,7
Self-employed	15	35,7	14	33,3
Servant Goverments	1	2,4	3	7,1
Other	4	9,5	3	7,1
Household Income:				
< Rp. 3.188.592,42	17	40,5	16	38,1
≥ Rp. 3.188.592,42	25	59,5	26	61,9
Total	**42**	**100**	**42**	**100**
Toddler Gender				
Man	22	52,4	19	45,2
Woman	20	47,6	23	54,8
Toddler Age				
< 36 Month	9	21,4	11	26,2
> 36 Month	33	78,6	31	73,8
Total	**42**	**100**	**42**	**100**

Table 1 reveals that the majority of subjects in the case group (40.5%) were between the ages of 26 and 35, whereas the majority of subjects in the control group (45.2%) were between the same ages. In the case group, most respondents were high school graduates (38.1%), while in the control group, the majority were also high school graduates (35.5%). This indicates that most respondents in both the case and control categories were high school graduates. 35.7% of respondents in the case and control categories were farmers, laborers, or fishermen. The frequency distribution of research participants based on household income was greater than Rp. 3,188,592.42 in the case group (59.5%) and the control group (61.9%). This demonstrates that most household incomes exceed Deli Serdang Regency's Regional Minimum Wage (UMR). The majority of toddlers in the case group were male, 52.4 percent, while the majority in the control group were female, 54.4 percent. In both the case and

control groups, most toddlers were older than 36 months, with proportions of 78.6% and 73.8%, respectively. This indicates that the preponderance of preschoolers is older than 36 months.

Table 2 Frequency Distribution of Drinking Water Quality

Drinking Water Quality	Stunting		Normal	
	n	%	n	%
Type of Facilities				
Tap water/PDAM	0	0	0	0
Drill/Pump/Dug Well	14	33,3	19	45,2
Rainwater Catchment	0	0	0	0
Packaged Mineral Water	0	0	0	0
Refill Water	4	9,5	0	0
Spring Protection	24	57,1	23	54,8
Distance of drinking water source and sewage collection site				
≤ 10 meters	15	35,7	19	45,2
> 10 meters	27	64,3	23	54,8
Drinking Water Treatment				
Cooked	42	100	42	100
Chlorination	0	0	0	0
Using filters	0	0	0	0
Unprocessed	0	0	0	0
Other	0	0	0	0
Drinking Water is Placed in a Closed Container				
Yes	42	100	42	100
No	0	0	0	0
Meets Physical Quality (Tasteless, Colorless, and Odorless)				
Yes				
No	32	76,2	33	78,6
	10	23,8	9	21,4
Meet Chemical Quality (pH, TDS, Nitrate, Nitrite, and Total Chromium)				
Yes	42	100	42	100
No	0	0	0	0
Meet Microbiological Quality (Total Coliform and E. Coli)				
Yes	17	40,5	30	71,4
No	25	59,5	12	28,6
Total	**42**	**100**	**42**	**100**
Fulfilling Physical, Chemical, and Microbiological Quality				
Qualify	17	40,5	31	73,8
Not eligible	25	59,5	11	26,2
Total	**42**	**100**	**42**	**100**

Table 2 shows that the case and control groups obtain the majority of their potable water from boreholes/pumps/dug wells at a frequency of 33.3% and 45.2%, respectively. In the case and control groups, the distance between the primary water source and the drainage reservoir was greater than 10 meters for 64.3% and 54.8%, respectively. There were 84 respondents (100%) who treated their potable water through the culinary process. 84 (100%) of respondents position ready-to-drink water in a sealed container. Regarding the physical condition of potable water, the majority of participants in the case and control groups qualified, at 76.2% and 78.2%, respectively. 84 (100%) of respondents in the case and control groups met the requirements for chemical quality. While the majority of microbiological quality in the case group was unqualified at 59.5%, the majority in the control group was qualified at 71.4%. As measured by physical, chemical, and microbiological parameters, the majority of the case group (59.5%) did not satisfy the requirements for safe drinking water quality. In contrast, the majority of the control group (73.8%) did meet the requirements.

Bivariate Analysis

Table 3. Cross Tabulation and *Chi-Square* Test Results of the Relationship between Drinking Water Quality and the Incidence of *Stunting* in Toddlers

Drinking Water Quality	Not Stunting		Stunting		Total		p	OR
	n	%	n	%	N	%		
Qualify	31	36,9	17	20,2	48	57,1	0,004	4,144
Not eligible	11	13,1	25	29,8	36	42,9		
Total	**42**	**50**	**42**	**50**	**84**	**100**		

Table 3 reveals that 36.9% of respondents with acceptable potable water quality have children under five who are not stunted, while 20.2% have stunted children. 13.1% of respondents with unqualified drinking water quality had infants who were not stunted, while 29.8% had children who were stunted. This indicates that respondents with unqualified drinking water quality and toddler stunting are disproportionately represented in the case group. Toddlers of respondents with substandard drinking water quality are more likely to be stunted.

The calculation of the p-value is 0.004 (0.004 0.05), so Ha is accepted (accept the hypothesis), and Ho is rejected (reject the hypothesis) (the hypothesis is rejected). This indicates a significant correlation between the variable quality of household drinking water and the prevalence of malnutrition among children aged 6 to 59 months in the Talun Kenas Health Center area of Deli Serdang Regency. This implies that in 2022, the incidence of

stunting among children aged 6 to 59 months in the Talun Kenas Health Center area of the Deli Serdang Regency may increase if the potable water quality does not satisfy the requirements. The calculated Odds Ratio is 4.144, indicating that the quality of drinking water that does not meet the requirements has a 4.144-fold greater likelihood of producing infants with short stature than that of drinking water that does meet the requirements. The desired confidence interval is presented with the Odds Ratio (CI)—this study with a 95% confidence interval. The 95% confidence interval for the results of this study was 1,646 to 10,435.

DISCUSSION

Inadequate sanitation can cause infectious diseases in infants, such as diarrhea and helminthiasis, which can disrupt the digestive process and absorption of nutrients; if this condition persists for an extended period, it can contribute to problems with malnutrition(Zurhayati & Hidayah, 2022); (Mukabutera, 2016); (Syahlidin, 2021) . Pure water is indispensable for various daily activities, including cleansing and cleaning latrines (MCK), as well as consumption. According to Ignasius Dwi Atmaja Sutapa, Executive Director of the Asia Pacific Center for Ecohydrology of the United Nations Educational, Scientific, and Cultural Organization (Apce-UNESCO), the lack of access to clean water is analogous to a child consuming nutritious food with unclean eating utensils, preventing the absorption of nutrients during digestion (Imani, 2020); (Adinda, 2021).

The results obtained during the study, in June - September 2022, obtained 42 toddlers in the case group and 42 in the control group. Data analysis was carried out in the case group of children aged 6 - 59 months with stunting conditions, while the control group was children aged 6 - 59 months with non-stunting conditions. The results showed that drinking water quality is a factor associated with the incidence of stunting. The chi-square test showed significant results with a p-value of 0.004. This shows a significant relationship between the variable quality of drinking water and the incidence of stunting in children aged 6 - 59 months, meaning that respondents with unqualified drinking water quality are at risk of causing stunting in toddlers.

The Odd Ratio obtained from the calculation is 4.144, meaning that respondents with unqualified drinking water quality have a 4.144 times greater chance of having stunted toddlers than respondents with qualified water quality. The quality of drinking water in question is drinking water that meets health requirements, namely physical, chemical, and

microbiological requirements by Permenkes No. 492 of 2010 concerning Drinking Water Quality Requirements. The results of this study obtained 95% CI 1.646 - 10.435. The odd ratio value found in the target population with 95% correctness ranges from 1.646 - 10.435.

A high number of microorganisms (such as pathogens and E. coli bacteria) in contaminated water, which, when ingested, can disrupt the human body's systems, is the cause of stunting. Diarrhea and nematodes are among the pathogens that reside in unclean water (Sugiarto, 2019); (Berhe, 2016). For example, children with limited access to pure water may experience recurrent diarrhea. The child's body loses many fluids and micronutrients (essential nutrients) during diarrhea. Zinc is one example (Adinda, 2020); (Sutyawan et al., 2019). When the body lacks zinc, the intestines damaged by gastroenteritis cannot regenerate. According to research, childhood zinc deficiency can result in stunting.

Children who lack access to pure water are also susceptible to worm infections (Hanum, 2020). Worms penetrating a child's body initially consume nutrients before decreasing his appetite. If left untreated, this condition will cause malnutrition and stunt the child's development (Tsaralatifah, 2020). This is what causes malnutrition in individuals with worm infections. The body does not assimilate nutrients from the food ingested in children with diarrhea or worms (Safitri, 2020). In fact, under certain circumstances, the body depletes its food reserves to combat the infection, causing the infant to become malnourished (Fatimah, 2020) (Wahyudi et al., 2015). Multiple infections that persist for an extended period can cause stunting. Infection rates correlate with unsanitary environmental conditions, such as lack of access to clean water, sanitation facilities, and refuse management (Hanifah et al., 2020); (Galgamuwa et al., 2017). Thus, providing pure water and sanitation plays a significant role in reducing stunting, as it is closely related to efforts to prevent disease transmission.

Due to prolonged malnutrition, stunting is a condition in which children fail to develop (both physically and mentally). A child's diminutive stature characterizes this disorder compared to their peers. Therefore, preventing stunting requires excellent nutrition in the first 1,000 days of life and an adequate supply of pure and potable water that meets health standards.

CONCLUSIONS

There is a significant relationship between the variable quality of household drinking water and the incidence of stunting in children aged 6 - 59 months, meaning that the quality of drinking water that does not meet the requirements can increase the incidence of stunting in children aged 6 - 59 months, with a value of (p = 0.004; OR = 4.144) and for the quality of drinking water suitable for consumption (seen from physical, chemical and microbiological parameters) in the case group the majority did not meet the requirements, namely 59.5%. In contrast, for the control group, the majority met the requirements, namely 73.8%.

REFERENCE

Adinda, D. (2020). Gambaran Kebiasaan Makan, Body Image Dan Status Gizi Remaja Putri di SMK Negeri 2 Sibolga. *Contagion: Scientific Periodical Journal Of Public Health And Coastal Health*, *2*(1), 39–50. https://doi.org/10.30829/contagion.v2i1.7787

Adinda, D. (2021). Body Image and Eating Habits of Students Female Student at Vokasi Senior High School Sibolga. *International Archives of Medical Sciences and Public Health*, *2*(1), 24–32.

Adzura, M. (2021). Hubungan Sanitasi, Air Bersih dan Mencuci Tangan dengan Kejadian Stunting Pada Balita di Indonesia. *Media Komunikasi Sivitas Akademika Dan Masyarakat*, *21*(February), 6.

Ainy, F. N., Susanto, T., & Susumaningrum, L. A. (2021). The relationship between environmental sanitation of family and stunting among under-five children: A cross-sectional study in the public health center of jember, indonesia. *Nursing Practice Today*, *8*(3), 173–178. https://doi.org/10.18502/npt.v8i3.5932

Aprizah, A. (2021). Hubungan karakteristik Ibu dan Perilaku Hidup Bersih Sehat (PHBS) Tatanan Rumah Tangga dengan kejadian Stunting. *Jurnal Kesehatan Saelmakers PERDANA*, *4*(1), 115–123.

Berhe. (2016). Prevalence of Diarrhea and Associated Factors Among Children Under-Five Years of Age in Enderta Woreda, Tigray, Northern Ethiopia, 2014. *International Journal of Therapeutic Applications*, *31*(1), 32–40. https://doi.org/10.20530/IJTA_31_32-37

Checkley. (2018). Multi-Country Analysis of The Effects of Diarrhoea on Childhood Stunting. *International Journal of Epidemiology*, *37*(4), 816–830. https://doi.org/10.1093/ije/dyn099

Emryssyah, C. J. (2021). Characteristics, Demographics And Malnutisi Of Toddlers In West Papua Province. *Contagion : Scientific Periodical of Public Health and Coastal Health*, *3*(1), 42–53. https://doi.org/10.30829/contagion.v3i1.9270

Fatimah, P. S. (2020). Konsumsi Buah, Sayur Dan Ikan Berdasarkan Sosio Demografi Masyarakat Pesisir Provinsi Sumatera Utara. Uin Sumatera Utara. *Contagion : Scientific Periodical of Public Health and Coastal Health*, *2*(1), 51–63. https://doi.org/10.30829/contagion.v2i1.7630

Febry, F., Ainy, A., & Sudirman, S. (2022). Identification of Food Diversity Factors to Overcome Stunting in Toddlers on the Musi River Suburbs, Palembang South Sumatra, Indonesia. *Jurnal Ilmu Kesehatan Masyarakat*, *13*(2), 224–235. https://doi.org/10.26553/jikm.2022.13.2.224-235

Galgamuwa, L. S., Iddawela, D., Dharmaratne, S. D., & Galgamuwa, G. L. S. (2017).

Nutritional status and correlated socio-economic factors among preschool and school children in plantation communities, Sri Lanka. *BMC Public Health*, *17*(1), 1–11. https://doi.org/10.1186/s12889-017-4311-y

Hanifah, R. N., Djais, J. T. B., & Fatimah, S. N. (2020). Prevalensi Underweight, Stunting, dan Wasting pada Anak Usia 12-18 Bulan di Kecamatan Jatinangor. *Jsk*, *5*(3), 3–7. https://doi.org/https://doi.org/10.24198/jsk.v5i3.28768

Hanum, S. (2020). Efektifitas Film dan Ular Tangga Terhadap Pengetahuan dan Sikap Siswa Sekolah Dasar Tentang Kecacingan. *Contagion : Scientific Periodical of Public Health and Coastal Health*, *3*(1), 1–15. https://doi.org/10.30829/contagion.v3i1.8903

Imani, N. (2020). *Stunting Pada Anak: Kenali dan Cegah Sejak Dini* (T. Sutanto (ed.); Cetakan Pe). Hijaz Pustaka Mandiri.

Izzati. (2016). *Hubungan Jenis Kelamin, Usia dan Riwayat Penyakit Infeksi dengan Kejadian Stunting Anak di RSUD Tugurejo*. 1–23.

Kementerian Kesehatan RI. (2018). *Laporan Nasional Riskesdas 2018*. Jakarta : Kementerian Kesehatan RI.

Mediani, Henny, S. (2020). Hubungan Faktor Air dan Sanitasi dengan Kejadian Stunting pada Balita di Indonesia. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1035–1044. https://doi.org/10.31004/obsesi.v5i2.521

Mukabutera. (2016). Rainfall variation and child health: effect of rainfall on diarrhea among under 5 children in Rwanda, 2010. *BMC Public Health*, *16*(1), 731–740.

Novianti, S. (2020). Hubungan Faktor Lingkungan Dan Perilaku Dengan Kejadian Stunting Pada Balita : Scoping Review. *Jurnal Kesehatan Komunitas Indonesia*, *16*(1), 153–164.

Permenkes RI. (2010). Peraturan Menteri Kesehatan Republik Indonesia Nomor 492/Menkes/Per/IV/2010 Tentang Persyaratan Kualitas Air Minum. In *Peraturan Mentri Kesehatan Republik Indonesia* (p. MENKES).

Rachmi, C. N., Wulandari, E., Kurniawan, H., Wiradnyani, L. A. A., Ridwan, R., & Akib, T. C. (2019). Buku Panduan Siswa Aksi Bergizi. *Kemenkes RI*, 1–188.

Rahmad, A. H. Al. (2016). Malnutrisi Pada Balita Pedesaan Dengan Perkotaan Berdasarkan Karakteristik Keluarga : Data Psg 2015 Malnutrition A Toddler Rural And Urban Areas Based Family Characteristics : Mns 2015. *Idea Nursing Journal*, *VII*(2), 43–52.

Safitri, R. (2020). *Hubungan Riwayat Penyakit Infeksi Dan Higiene Sanitasi Lingkungan Dengan Status Gizi Balita Usia 24-59 Bulan Di Wilayah Kerja Puskesmas Talang Pangeran Kabupaten Ogan Ilir Tahun 2019*. 1–32.

Salman, Arbie, F. Y., & Humolongo, Y. (2017). Hubungan Pengetahuan Gizi Ibu dengan Kejadian Stunting pada Anak Balita di Desa Buhu Kecamatan Talaga Jaya Kabupaten Gorontalo. *Health and Nutritions Journal*, *III*(I), 42–53.

Schmidt, C. W. (2014). Beyond Malnutrition: The Role of Sanitation in Stunted Growth. *Environmental Health Perspectives*, *122*(11), 298–303.

Sugiarto. (2019). Faktor Risiko Kejadian Diare Pada Balita. *Jurnal Contagion*, *1*(1), 47–57. https://doi.org/10.30829/contagion.v1i01.4434

Sutyawan, S., Khomsan, A., & Sukandar, D. (2019). Pengembangan Indeks Ketahanan Pangan Rumah Tangga dan Kaitannya dengan Tingkat Kecukupan Zat Gizi dan Status Gizi Anak Balita. *Amerta Nutrition*, *3*(4), 201. https://doi.org/10.20473/amnt.v3i4.2019.201-211

Syahlidin, T. (2021). Analysis of the Implementation of Health Promotion Programs on Diarrhea Disease Control at Kuala Public Health Center, Bireuen Regency. *International Archives of Medical Sciences and Public Health*, *2*(1), 44–56.

Tsaralatifah, R. (2020). Faktor yang Berhubungan dengan Kejadian Stunting pada Baduta di Kelurahan Ampel Kota Surabaya. *Amerta Nutrition*, *4*(2), 171. https://doi.org/10.20473/amnt.v4i2.2020.171-177

Uliyanti Uliyanti, Didik Gunawan Tamtomo, S. A. (2017). Faktor yang berhubungan dengan kejadian stunting pada balita usia 24-59 bulan. *Jurnal Vokasi Kesehatan*, *3*(2), 67–77.

Wahyudi, B. F., Sriyono, & Indarwati, R. (2015). Analisis Faktor yang Berkaitan dengan Kasus Gizi Buruk pada Balita. *Jurnal Pediomaternal*, *3*(1), 86.

World Health Organization. (2009). *on Hand Hygiene in Health Care First Global Patient Safety Challenge Clean Care is Safer Care*.

Yuliani Soeracmad, Y. S. (2019). Hubungan Sanitasi Lingkungan Rumah Tangga Dengan Kejadian Stunting Pada Anak Balita Di Puskesmas Wonomulyo Kabupaten polewali Mandar Tahun 2019. *J-KESMAS: Jurnal Kesehatan Masyarakat*, *5*(2), 138. https://doi.org/10.35329/jkesmas.v5i2.519

Zurhayati, Z., & Hidayah, N. (2022). Faktor Yang Berhubungan Dengan Kejadian Stunting Pada Balita. *JOMIS (Journal of Midwifery Science)*, *6*(1), 1–10. https://doi.org/10.36341/jomis.v6i1.1730