Analysis Environmental Sanitation Distribution Patterns Stunting Incidence in Silahisabungan Subdistrict

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Track Record Article

Accepted: 26 Oktober 2024
Revised: 8 November 2024
Published: 9 December 2024

How to cite :
Syaputri, D., S, T. T. B., Manalu, S. M. H., Apsari, D. A., & Suprawihadi, R. (2024). Analysis Environmental Sanitation Distribution Patterns Stunting Incidence in Silahisabungan Subdistrict. *Contagion : Scientific Periodical of Public Health and Coastal Health*, 6(2), 1373–1382.

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Abstract

Stunting is a public health problem caused by chronic malnutrition and is often exacerbated by poor environmental sanitation. Environmental sanitation factors that cause it are clean water management, waste management, feces management and sewerage management. Improving sanitation infrastructure and promoting healthy living behaviors are essential to reduce stunting and support sustainable health outcomes. In Silahisabungan Subdistrict, Dairi Regency, this study is to examine the distribution pattern of environmental cleanliness and its relationship to the prevalence of stunting. This type of research is observational with a case control design and ecological approach, to obtain an overview of the distribution patterns of stunting and environmental sanitation using geographic information system applications. The case sampling technique used total sampling. Where all stunted toddlers were taken as cases as many as 58 toddlers and controls as many as 58 toddlers. Purposive sampling was used to conduct the research sampling. This study's data was analysed using univariate, bivariate, and multivariate methods, including logistic regression, chi-square statistical tests, and mapping of stunting data using Google Earth and Quantum GIS. The results showed that there was a significant relationship between water management (p-value=0.000), waste management (p-value=0.032), waste management (p-value=0.000) and there was no significant relationship between feces management (p-value=0.193) with the incidence of stunting. Improving environmental sanitation is a key factor in reducing the prevalence of stunting. Interventions that focus on increasing access to clean water, building sanitation facilities, and educating the community about clean and healthy living behaviors need to be prioritized.

Keywords: Environmental Sanitation, Distribution Pattern, Stunting

INTRODUCTION

The second target of the Sustainable Development Goals (SDGs), which is to eradicate hunger and all types of malnutrition by 2030 and achieve food security, includes stunting as one of its targets. By 2025, the goal is to cut the stunting rate by 40% (UNICEF, 2019). Efforts to overcome stunting must be carried out in accordance with the factors that cause this situation. Indonesia has regions that are spread out and have their own characteristics. These differences in characteristics cause variations in handling called spatial effects. This modeling is to be able to see what factors affect the prevalence of short and very short toddlers in a particular area according to the conditions of the area (Revildy et al., 2020).

The prevalence of stunted children worldwide in 2019 was 144 million children (21.3%). Asia has the highest prevalence of stunted children worldwide at 78.2 million children (54%). Southeast Asia has the 2nd highest prevalence of stunted children, with 13.9 million children

(24.7%). Indonesia has the 3rd highest prevalence of stunted children in Southeast Asia (27.67%). According to World Health Organisation (WHO) data on stunting prevalence among children under five years old, which was published in 2019, South East Asia continues to have the highest prevalence rate of stunting in the world (31.9%), second only to Africa (33.1%). Indonesia is the sixth country in South-East Asia after Bhutan, Timor Leste, Maldives, Bangladesh, and India, at 36.4% (WHO, 2020).

The impact of the incidence of stunting is very diverse which can affect the growth and development of sufferers, including disrupting the growth of children's height and weight so that children tend to be shorter with body weight tending to be far below the average child of their age, non-optimal child development that causes children to walk late or their motor skills are less than optimal, and affect learning ability because stunting conditions affect children's IQ lower than their peers. So it can be seen that stunting has an impact on children's growth and development both physically and cognitively (Kemenkes RI, 2018).

The prevalence of toddler stunting can be impacted by an unfavourable environment. Numerous studies have shown a strong correlation between the occurrence of stunting in children under five and the cleanliness of the environment and the history of infectious diseases. Environmental Sanitation has a significant relationship with the incidence of stunting. Poor environmental sanitation is associated with the incidence of stunting in children under five (Wulandari et al., 2019).

The low access of families to sanitation facilities today, environment-based diseases are the main cause of death in Indonesia, especially in infants and toddlers and contribute more than 80% of diseases suffered by infants and toddlers such as infectious diseases, appetite disorders, digestive tract disorders and so on (Soraya et al., 2022). Poor sanitation can invite infectious diseases in infants such as diarrhea and helminthiasis, which can interfere with the digestive process in the absorption of nutrients. Some infectious diseases suffered by babies can cause babies to lose weight. If this condition occurs for a long time, it can lead to stunting problems (Zairinayati et al., 2019).

Geographic Information Systems (GIS) in the health sector are useful in improving health surveillance and linking and integrating various data by describing data analysis directly on the map (Rahma et al., 2023). Spatial-based information can describe actual conditions in the field and can be easily understood. Information on the distribution of community-based total sanitation implementation and information on the distribution of location-based or spatial stunting incidence in the region will greatly support effective and efficient program implementation (Bakara et al., 2023).

The condition of stunting prevalence in North Sumatra based on the Indonesian Nutrition Status Study Data is very concerning. 33 districts / cities in North Sumatra have a “red” status, aka having a stunting prevalence above 30%. Silalahisabungan sub-district is included in the prevalence of stunting with a high rate of over 30%. From the data obtained, Silalahisabungan District is an area with a fairly high incidence of stunting, namely 78 cases in 2021. Stunting data in Dairi Regency is not yet in the form of GIS. Mapping the distribution of cases has not been done. This causes the distribution of stunting cases by region in Dairi Regency to be unknown. Identification and analysis of environmental sanitation related to the incidence of stunting in Dairi Regency is needed, so that control efforts become more optimal. It is necessary to analyze the distribution pattern of environmental sanitation with the incidence of stunting in Silalahisabungan Subdistrict, Dairi Regency.

METHODS

This type of research is observational research using Case control design. This research was conducted at the Silahisabungan Health Center Work Area in June 2024. The case population in this study were all stunting patients recorded in medical records at the Silahisabungan Health Center in 2024, totaling 58 people. While the control population in this study are people who are not stunting sufferers who live in the Silahisabungan Health Center working area.

The sample of this study consisted of case samples and control samples in a ratio of 1: 1 with a total sample of 116 samples consisting of 58 case samples and 58 control samples. The sampling technique with purposive sampling by making the criteria of the respondent, namely the mother of a toddler who has a card to be healthy, willing to be a respondent. Data collection for stunting distribution of stunting toddlers using GPS to get GIS data.

Data collection of several factors that cause stunting with questionnaire tools with mothers who have toddlers, factors include sanitation factors related to environmental sanitation such as water management, feces management, waste management, waste management with eligible and ineligible criteria. Data collection was carried out through direct interviews accompanied by observation sheets and GPS type Garmin Etrex 10, map source, Quantum GIS, and Google Earth to collect the coordinates of the homes of stunted toddlers living in Dairi Regency. The data were analyzed by univariate, bivariate, and multivariate analysis using chi-square and regression logistic statistical tests with 95% confidence level (α = 5%).

RESULTS

Table 1. Analysis of Environmental Sanitation Risk Factors with the Incidence of Stunting in the Silahisabungan Health Center Working Area in 2024

Variables	Stunting Incidence						OR 95% CI	P-*values*
	Case		Control		Total			
	n	%	n	%	n	%		
Water Management								
No Risk	20	17.2%	50	43.1%	70	60.3%	7.932 (2.648-23.758)	0.000
Risk	38	32.8%	8	6.9%	46	39.7%		
Feces Management								
No Risk	38	32.8%	53	45.7%	91	78.4%	2.349 (0.649-8.504)	0.193
Risk	20	17.2%	5	4.3%	25	21.6%		
Garbage Management								
No Risk	18	15.5%	42	36.2%	60	51.7%	3.136 (1.100-8.937)	0.032
Risk	40	34.5%	16	13.8%	56	48.3%		
Waste Management								
No Risk	8	6.9%	36	31.0%	44	37.9%	9.689 (3.109-30.197)	0.000
Risk	50	43.1%	22	19.0%	72	62.1%		

Based on Table 1, it is shown that respondents who experienced stunting and had water management practices with a risk accounted for 38 respondents (32.8%), while in the control group, those with water management practices with a risk accounted for 8 respondents (6.9%). Statistical analysis revealed a p-value of 0.000 ($p < 0.005$), indicating a significant relationship between water management and stunting in the working area of Silahisabungan Health Center in 2024. The Odds Ratio (OR) value was 7.9 (95% CI: 2.648–23.758), demonstrating that respondents with water management practices carrying a risk are 7.9 times more likely to experience stunting compared to respondents with water management practices without risk.

Furthermore, it is observed that 20 respondents (17.2%) in the stunting group (case group) had fecal waste management practices with a risk, while 5 respondents (4.3%) in the control group exhibited the same. Statistical analysis yielded a p-value of 0.193 ($p > 0.005$), suggesting no significant relationship between fecal waste management and stunting in the working area of Silahisabungan Health Center in 2024.

Additionally, it is evident that out of 116 total respondents (100%), 40 respondents (34.5%) in the case group had solid waste management practices with a risk, while 16 respondents (13.8%) in the control group had the same. Statistical analysis produced a p-value of 0.032 ($p < 0.005$), indicating a significant relationship between solid waste management and stunting in the working area of Silahisabungan Health Center in 2024. The Odds Ratio (OR) value was 3.1 (95% CI: 1.100–8.937), indicating that respondents with solid waste management practices carrying a risk are 3.1 times more likely to experience stunting compared to respondents with solid waste management practices without risk.

Lastly, it was found that 50 respondents (43.1%) in the case group had solid waste management practices with a risk, while 22 respondents (19.0%) in the control group exhibited the same. Statistical analysis revealed a p-value of 0.000 ($p < 0.005$), confirming a significant relationship between solid waste management and stunting in the working area of Silahisabungan Health Center in 2024. The Odds Ratio (OR) was 9.6 (95% CI: 3.109–30.197), indicating that respondents with solid waste management practices carrying a risk are 9.6 times more likely to experience stunting compared to those with solid waste management practices without risk.

Table 2. Multivariate Analysis

Variables	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I for EXP (B)	
							Lower	Upper
Water Management	2.071	.560	13.689	1	.000	7.932	2.648	23.758
Feces Management	.854	.656	1.692	1	.193	2.349	.649	8.504
Garbage Management	1.143	.534	4.576	1	.032	3.136	1.100	8.937
Waste Management	2.271	.580	15.331	1	.000	9.689	3.109	30.197
Constant	-2.988	.610	23.998	1	.000	.050		

Table 2. shows that the most dominant factor influencing the incidence of stunting in the Silahisabungan puskesmas working area is waste management. From the final model of multivariate analysis, the results show that respondents who have risky waste management have a 15,331 times chance of having stunted children compared to respondents who have waste management that is not at risk, while for respondents who have risky water management have a 13,689 times chance of having stunted children compared to respondents who have water management that is not at risk.

Based on the table above, the results of spatial analysis / distribution analysis of the incidence of stunting in the Silahisabungan Health Center working area in Dairi Regency are that the incidence of stunting is clustered or clusters occur. From the sanitation problems taken (Clean Water Management, Waste Management, Fecal Management and Waste Management) both in the stunting group, it was found that the waste cluster and the primary stunting cluster coincided (the waste cluster was in the primary stunting cluster) so it should be suspected that there is a contribution from poor waste management to the incidence of stunting with an Odd Ratio (OR) value of 9.6 (3,109-30,197), this can be said that respondents who have risky waste management are 9.6 times more likely to be stunted than respondents who have waste management that is not at risk. With this map, the health center can find out which areas have

stunting cases and which environmental sanitation factors are suspected to have the most influence on stunting cases, so that the health center can take steps in tackling stunting cases in the Silahisabungan Health Center Working Area, Dairi Regency.

Distribution of Environmental Sanitation with the Incidence of Stunting in Silahisabungan Subdistrict, Dairi Regency

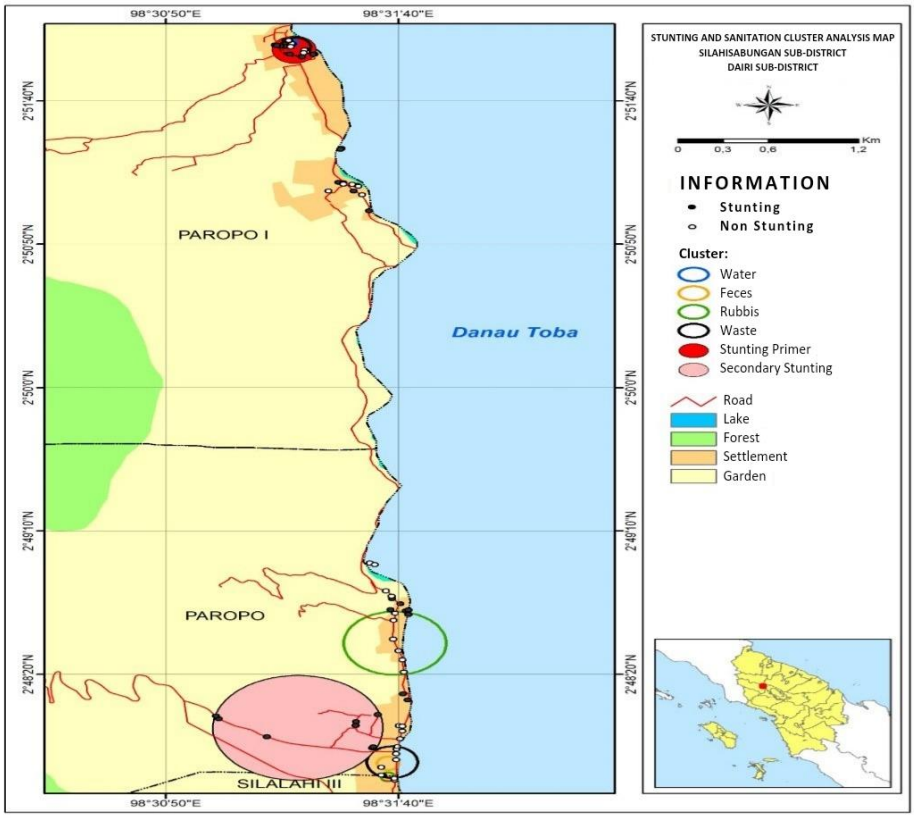

Figure 1. Stunting and Sanitation cluster analysis map

DISCUSSION

In the case group there were 38 (32.8%) respondents who had risky water management and in the control group there were 8 (6.9%) respondents who had risky water management. The OR results show that respondents who have risky water management will be 7.932 times more likely to be stunted than respondents who have water management that is not at risk. A decent source of clean water is one of the factors associated with stunting (Ningsi et al., 2024). Risky water management will cause toddlers to have growth disorders or impaired absorption of nutrients which directly causes the body to lack nutrients. Proper water management is considered starting from the source of clean water and then distributing it to the community using a type of pipe that does not contain chemicals and does not contaminate clean water until the distribution stage to community homes but the community is also expected to realize the importance of treating clean water before use (Anwar et al., 2022).

The results of this study are in line with research Ramdaniati et al., (2019), which states that there is a significant relationship between clean water facilities and the incidence of stunting in toddlers in Labuan sub-district. Families who have unqualified clean water facilities will be 2.182 times more susceptible to stunting. Unqualified water management will reduce the immune system of toddlers and make them vulnerable to various infectious diseases, and can interfere with cognitive development.

In a total of 58 respondents in the case group, there were 20 (17.2%) respondents who had risky fecal management and 5 (4.3%) respondents in the control group who had risky fecal management. From the statistical test results, it was found that there was no significant relationship between fecal management and the incidence of stunting. One form of good fecal management is the availability of fecal disposal facilities or latrines. The availability of healthy latrines can prevent the transmission of diseases carried by vectors that have direct contact with feces. In addition, open defecation behavior is closely related to the high incidence of diarrhea, which can affect child growth (Yohana et al., 2023; Pratama et al., 2022).

In the case group there were 40 (34.5%) respondents who had risky garbage management while in the control group there were 16 (13.8%) respondents who had risky garbage management. The OR results show that respondents who have risky garbage management will be 3.136 times more likely to be stunted than respondents who have non-risky waste management. The results of this study are supported by research Mariana et al., (2021), which says that there is a significant relationship between unhealthy garbage management and the incidence of stunting (p-value = 0.004) with an Odds Ratio value = 4.884, meaning that families who have unhealthy garbage management have a 4.884 times higher risk of being stunted than families who have healthy waste management.

Household garbage management is a waste management activity by prioritizing the principles of reducing (Reduce), reusing (Reuse), and recycling (Recycle). These three principles are useful not only in terms of health but also to avoid environmental damage. In the results of this study, it was found that there were still many respondents who did not have a garbage disposal in their house and there was no garbage management action either from themselves or the local government to carry out the waste transportation process regularly so that the majority of the community solved the garbage problem by burning or hoarding it in the backyard (Junaidi et al., 2023; Rahmi et al., 2024). Unhealthy waste management will invite disease-transmitting vectors such as flies, cockroaches, and rats whose presence will become disease transmitters for family members (Soraya et al., 2022; Zalukhu et al., 2022).

Based on the results of the study in 58 (100%) case groups, there were 50 (43.1%) respondents who had risky waste management and in the control group there were 22 (19%) respondents who had risky waste management. The Odds Ratio value results show that respondents who have risky garbage management will be 9.689 times more likely to be stunted than respondents who have non-risky garbage management. The results of this study are in line with research Ilahi et al., (2022) which states that there is a significant relationship between liquid garbage management and the incidence of stunting in the Pangkajene City Health Center working area with an OR value = 4.151 which means that respondents who have unqualified liquid garbage management will be 4.151 times more at risk of stunting than respondents who have qualified liquid garbage management.

Wastewater that is stagnant in the sewer drain can cause the environment around the house becomes dirty, environmental pollution occurs and can become a breeding ground for breeding ground for disease seeds (Sasmita et al., 2022; Sihombing et al., 2024). Poor sewerage will become a hotbed of disease because, animals such as insects can live in dirty places where there is stagnant water, so that it can become pollution in the environment and become a trigger for various environment-based diseases, one of which is stunting (Anas et al., 2022; Aisah et al., 2019).

Household wastewater is sourced from various activities from the household including used bathing water, used laundry water, and others. Waste water disposal facilities can be in the form of sewers or pipes used to carry waste water from its source. The area surrounding the home will become unclean due to stagnant wastewater, which permits contamination and creates an environment where illness seeds can grow. According to the study's findings, the majority of the community still recklessly disposes of their trash in holes behind houses or on the ground, which has an indirect connection to lake water. As a result, the local health centre needs to pay extra attention to solving these issues.

CONCLUSIONS

The study's findings indicate a strong correlation between waste management, water management, and waste management. Furthermore, there is no meaningful connection between the prevalence of stunting and faecal management. Increased access to sanitary facilities, management of stunting risk factors, and community counseling particularly for mothers with toddlers are also imperative. In order to lower the risk of toddler stunting, it is anticipated that the community will enhance sanitation aspects.

REFERENCE

Aisah, S., Ngaisyah, R. D., & Rahmuniyati, M. E. (2019). Personal Hygiene Dan Sanitasi Lingkungan Berhubungan dengan Kejadian Stunting di Desa Wukirsari Kecamatan Cangkringan. *Prosiding Seminar Nasional Multidisiplin Ilmu*, *1*(2), 49–55. http://prosiding.respati.ac.id/index.php/PSN/article/download/182/176

Anas, A. S., Ikhtiar, M., & Gobel, F. A. (2022). Hubungan Faktor Lingkungan dan Kejadian Stunting pada Balita Di Wilayah Kerja Puskesmas Taraweang Kabupaten Pangkep. *Journal of Muslim Community Health (JMCH) 2022*, *3*(3), 1–12.

Anwar, K., & Setyani, L. I. (2022). Hubungan Perilaku Pengelolaan Air Minum dan Tingkat Kecukupan Zat Gizi Makro dengan Status Gizi Balita. *Amerta Nutrition*, *6*(1), 306–313. https://doi.org/10.20473/amnt.v6i1sp.2022.306-313

Bakara, S. M., Widodo, A. P., & Lubis, E. S. (2023). Analisis Spasial Sanitasi Total Berbasis Masyarakat dan Kejadian Stunting di Kabupaten Cianjur Tahun 2017. *Preventif : Jurnal Kesehatan Masyarakat*, *14*(2), 1–10. https://doi.org/10.22487/preventif.v14i2.722

Ilahi, W., Suryati, Y., Noviyanti, Mediani, H. S., & Rudhiati, F. (2022). Analisis Pengaruh Wash (Water, Sanitation and Hygiene) terhadap Kejadian Stunting pada Balita. *Jurnal Keperawatan Silampari*, *6*(1), 455–465. https://doi.org/10.31539/jks.v6i1.4442

Junaidi, J., & Utama, A. A. (2023). Analisis Pengelolaan Sampah Dengan Prinsip 3R (Reduce, Reuse, Recycle) (Studi Kasus Di Desa Mamak Kabupaten Sumbawa). *JISIP (Jurnal Ilmu Sosial Dan Pendidikan)*, *7*(1), 706–713. https://doi.org/10.58258/jisip.v7i1.4509

Kemenkes RI. (2018). Buletin Stunting. Jakarta : Kementerian Kesehatan RI.

Mariana, R., Nuryani, D. D., & Angelina, C. (2021). Hubungan sanitasi dasar dengan kejadian stunting di wilayah kerja puskesmas Yosomulyo kecamatan Metro pusat kota Metro tahun 2021. *JOURNAL OF Community Health Issues*, *1*(2), 1–8. https://doi.org/10.56922/chi.v1i2.99

Ningsi, N. W., & Mayangsari, R. (2024). Water Sanitation and Stunting Incident in Banggae District, Majene Regency, West Sulawesi. *Jurnal Ilmiah Kesehatan (JIKA)*, *6*(1), 97–105. https://doi.org/10.36590/jika.v6i1.720

Pratama, P. H., Ghifary, H., Khairani, D. S., Syabil, S., & Amalia, R. (2022). Pengaruh Perbedaan Pola Makan Terhadap Penyebab Penyakit Gastritis Pada Remaja Laki-Laki Dan Perempuan: a Systematic Review. *Jurnal Kesehatan Tambusai*, *3*(2), 168–174. https://doi.org/10.31004/jkt.v3i2.4488

Rahma, C. A. A., Razak, R., & Septiawati, D. (2023). Analisis Spasial Kasus Stunting Berdasarkan Fasilitas Kesehatan dan Korelasi Faktor Risiko Lingkungan Pada Balita di Kabupaten Ogan Ilir Tahun 2023. *Media Publikasi Promosi Kesehatan Indonesia (MPPKI)*, *6*(12), 2588–2598. https://doi.org/10.56338/mppki.v6i12.4333

Rahmi, C., Arief Noor, M., Mulasih, S., Surya Lesmana, A., Syahreza, A., & Saefullah, A. (2024). Menghidupkan Prinsip 3R: Reuse, Reduce, dan Recycle untuk Masa Depan yang Berkelanjutan Di Kelompok Wanita Tani Garuda 12 Cipayung, Ciputat. *Journal of Community Research & Engagement*, *1*(1), 103–112. https://jurnal.stieganesha.ac.id/index.php/jcre/article/view/43

Ramdaniati, S. N., & Nastiti, D. (2019). Hubungan Karakteristik Balita, Pengetahuan Ibu Dan Sanitasi Terhadap Kejadian Stunting Pada Balita Di Kecamatan Labuan Kabupaten Pandeglang. *Hearty*, *7*(2), 47–54. https://doi.org/10.32832/hearty.v7i2.2877

Revildy, W. D., Lestari, S. S. S., & Nalita, Y. (2020). Pemodelan Spatial Error Model (Sem) Angka Prevalensi Balita Pendek (Stunting) Di Indonesia Tahun 2018. *Seminar Nasional Official Statistics*, *1*(1), 1224–1231. https://doi.org/10.34123/semnasoffstat.v2020i1.662

Sasmita, H., Sapriana, S., & Bernike Magdalena Sitorus, S. (2022). Hubungan Pemanfaatan

Sarana Sanitasi Terhadap Kejadian Stunting Tahun 2021. *Poltekita : Jurnal Ilmu Kesehatan*, *16*(1), 8–15. https://doi.org/10.33860/jik.v16i1.753

Sihombing, N. H., Soedjadi, T. T. B., Syaputri, D., Manalu, S. M. H., & Apsari, D. A. (2024). Analysis of Distribution Patterns of Environmental Risk Factors with Malaria Incidents in the Working Area of the Tanjung Tiram Community Health Center, Batu Bara Regency. *Contagion : Scientific Periodical of Public Health and Coastal Health*, *6*(1), 358–371.

Soraya, S., Ilham, I., & Hariyanto, H. (2022). Kajian Sanitasi Lingkungan Terhadap Kejadian Stunting di Wilayah Kerja Puskesmas Simpang Tuan Kabupaten Tanjung Jabung Timur. *Jurnal Pembangunan Berkelanjutan*, *5*(2), 98–114. https://doi.org/10.22437/jpb.v5i1.21200

UNICEF. (2019). *Adolescents Statistics : Investing in a safe, healthy and productive transition from childhood to adulthood is critical*. https://doi.org/10.35816/jiskh.v12i2.408

WHO. (2020). *Title levels and trends in child malnutrition*.

Wulandari, Rahayu, F., & Darmawansyah. (2019). Hubungan Sanitasi Lingkungan dan Riwayat Penyakit Infeksi Dengan Kejadian Stunting di Wilayah Kerja Puskesmas Kerkap Kabupaten Bengkulu Utara Tahun 2019. *Jurnal Ilmiah Avicenna*, *14*(2), 6–13. https://doi.org/https://doi.org/10.36085/avicenna.v14i02.374

Yohana, L., Nurdin, A., Fitria, U., Dinen, K. A., Kurnia, R., Aceh, U. A., Aceh, A., Aceh, A., Aceh, A., & Aceh, A. (2023). Faktor -Faktor Yang Mempengaruhi Diare Pada Anak. *Public Health Journal*, *2*(1), 30–35.

Zairinayati, Z., & Purnama, R. (2019). Hubungan Hygiene dan Sanitasi Lingkungan Dengan Kejadian Stunting Pada Balita. *Babul Ilmi Jurnal Ilmiah Multi Science Kesehatan*, *10*(1), 78–91. https://doi.org/10.36729/bi.v10i1.805

Zalukhu, A., Mariyona, K., & Andriani, L. (2022). Hubungan sanitasi lingkungan dengan kejadian stunting pada anak balita (0-59) bulan di Nagari Balingka Kecamatan IV Koto Kabupaten Agam Tahun 2021. *Jurnal Ners*, *6*(1), 52–60.