



# Analysis of Fulfillment of Four Aspects in Drinking Water and Incidence of Stunting in Coastal Areas: Case Study of Paluh Sibaji Village, Pantai Labu Sub-district

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<p><b>Track Record Article</b></p> <p>Accepted: 22 January 2024 Revised: 13 February 2024 Published: 08 March 2024</p> <p><b>How to cite :</b> Indirawati, Malem, S., Salmah, U., Ashar, T., Panjaitan, Masyitah, A., Situmorang, Ropita, Febrine, R., &amp; Lestari, Rizka, A. (2024). Analysis of Fulfillment of Four Aspects in Drinking Water and Incidence of Stunting in Coastal Areas: Case Study of Paluh Sibaji Village, Pantai Labu Sub-district. <i>Contagion: Scientific Periodical Journal of Public Health and Coastal Health</i>, 6(1), 48–58.</p>	<p style="text-align: center;"><b>Abstract</b></p> <p><i>Paluh Sibaji Village, Pantai Labu District, in a coastal area located in Deli Serdang district, has only 0.5% reduction in stunting from 2022 to 2023. The prevalence of stunting in Deli Serdang District was 13.9 in 2023 has increased by 1.4 percent from 2021. Pantai Labu sub-district is located in a coastal area with 60 cases of stunting, 10 of which were found in Paluh Sibaji village. Proper sanitation is an indirect factor causing stunting, including meeting the four aspects (quality, quantity, continuity and affordability) in drinking water. This research aimed to analyze the Four aspect of drinking water sources with stunting incidents. This type of research was analytical with a cross sectional study design. The population was 375 houses of mothers with toddlers and 141 houses sample spread across 4 hamlets. The sampling technique used was cluster sampling and data analysis used Chi square statistical test by using SPSS version 25. Data were collected using a questionnaire designed in the ceting card tool which was applied via Android. The results of the research found that 16.3% of children under five were stunted and based on the type of clean water source, namely dug wells 22 people (15.6%), drilled wells 33 people (23.4%), and municipal waterworks 86 people (61.0%), only 3.5% of houses met the four aspects. The statistical test results showed that the variables of fulfilment of the four aspects of drinking water, and drinking water treatment were not related with the incidence of stunting (<math>P_v &gt; 0.05</math>). Other basic sanitation factors besides clean water and drinking water sources can become environmental management priorities in an effort to provide proper sanitation in Paluh Sibaji village to reduce stunting.</i></p> <p><b>Keyword:</b> <i>Affordability, Continuity, Stunting, Quality, Quantity of Drinking Water</i></p>
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## INTRODUCTION

Stunting is a disease that affects many toddlers in Indonesia, and is a national problem. Stunting is part of the Sustainable Development Goals (SDGs) target, namely target 3 of a healthy and prosperous life and target 6 of clean water and adequate sanitation. The Ministry of National Development Planning (2020) lists stunting as a national priority concern, with the goal of bringing the prevalence of stunting down from 24.4 percent in 2021 to 14 percent in 2024. According to the 2016 Global Nutrition Report, Indonesia had the 108th-highest rate of stunting out of 132 countries. The National Team for the Acceleration of Poverty Reduction (2019) said that Indonesia's goal to lower the prevalence of stunting is in line with the

worldwide goal set by the World Health Assembly (WHA), which is to lower the condition's prevalence by 40% by 2025 compared to 2013 levels.

In addition, the SDGs target is to eliminate all forms of malnutrition by 2030 (United Nations, 2023). In order to reduce the incidence of stunting in toddlers to 19.4% by 2024, efforts must be made to expedite the reduction of stunting from the existing condition. North Sumatra Province still has districts/cities with red status which indicates that the prevalence in districts/cities of stunting is above 30 percent, therefore North Sumatra province included in 12 provinces as a priority locus for reducing the incidence of stunting (Indonesian Ministry of Health, 2022). Deli Serdang Regency is one of the regencies in North Sumatra province which has 22 sub-districts, including Pantai Labu sub-district which is in the coastal area. The prevalence of stunting in Deli Serdang district is 13.9 percent in 2023 and this figure has increased by 1.4 percent from 2021 (Kemenkes RI, 2022, 2023). Paluh Sibaji Village, Pantai Labu Sub-district is in a coastal area located in Deli Serdang Regency in 2023 the number of stunting cases was 60 cases, 10 of which were found in Paluh Sibaji Village. Coastal areas have limitations in terms of proper sanitation. Proper sanitation is an indirect factor causing stunting, including clean water and fulfilling the 4 aspects (quality, quantity, continuity and affordability) in drinking water. The direct causes are long-term (chronic) malnutrition, consumption patterns, parenting patterns, history of infectious diseases and other factors (Rosha et al., 2020).

The requirements for raw water sources for drinking water based on the drinking water security plan in Indonesia are to meet the four requirements consisting of quality, quantity, continuity and affordability (PUPR, 2021). Drinking water quality requirements based on Minister of Health Regulation No. 2 of 2023 meets health standards including physical, chemical, biological and radioactive quality. The quantity is the availability of basic drinking water needs of 10 m<sup>3</sup>/head of family/month or 60 liters/person/day in accordance with Regulation of the Minister of Public Works and Public Housing No. 29/PRT/M/2018 of 2018 on Technical Standards for Minimum Service Standards for Public Works and Public Housing. Continuity is the uninterrupted distribution of drinking water to the community 24 hours/day in accordance with Government Regulation Number 16 of 2005 concerning Development of Drinking Water Supply Systems. Affordability means drinking water tariffs do not exceed 4% of the customer's income per month. If these four requirements are met then clean water is said to meet the four aspects health requirement (IUWASH, 2015).

The phenomenon of stunting cases in Paluh Sibaji Village with minimal sanitation conditions, especially related to clean water and drinking water, has given rise to the desire to

analyze whether the four aspect of drinking water plays an indirect risk factor in causing stunting incidents in Paluh Sibaji village. Initial survey results found that 6% of the community did not have a source of clean water as a source of raw drinking water, clean water did not meet the continuity aspect. Based on this problem, this research aims to analyze the relationship between adequate sanitation based on fulfilling the four aspects in drinking water and the incidence of stunting.

## **METHODS**

This type of research was quantitative with a cross sectional study design. The research location was in Paluh Sibaji village with 4 hamlets. The population was 375 houses of mothers with toddlers and a sample of 141 houses spread across 4 hamlets, the sampling technique used was cluster sampling. Data were collected using a questionnaire designed in the ceting card tool which was applied via Android. Stunting is identified by assessing a toddlers length or height, if their height-for-age is more than two standard deviations below the WHO Child Growth Standards median (WHO, 2023). The questionnaire contains questions related to stunting data, clean water sources, and the aspects of drinking water derived from WHO, Core questions on water, sanitation and hygiene for household surveys and other questionnaires have been tested for validity and reliability with the requirement that the calculated r value is greater than the r table value, and reliable with a Cronbach alpha value greater than 0.60. Clean water quality measurements include colour (<10 TCU), turbidity (<3 NTU), odourless and TDS (<300 mg/l) according to the environmental quality standard values contained in Permenkes No. 2 of 2023 concerning the Implementation Regulations of Government Regulation No. 66 of 2014 concerning Environmental Health.

Univariate and bivariate data analysis using the Chi square statistical test by using SPSS version 25. This research has gone through etchical trials from the Health Research Ethics Committe of the Universitas Sumatera Utara by no 998/KEPK/USU/2023.

## RESULTS

### Characteristic of Respondents

Based on the data collection from 141 subjects, the results were described in the following table:

**Table 1. Dstribution of Mothers and Kids Characteristic**

Characteristics	n = 141	%
<b>Age at marriage (mother)</b>		
< 20 years old	86	61.0
21-35 years old	55	39.0
<b>Parity (mother)</b>		
Primigravida (anak pertama)	38	27.0
Secundigravida (anak kedua)	99	70.2
Multigravida (jumlah anak >2)	4	2.8
<b>Pregnancy distance (mother)</b>		
< 2 year	8	7.8
≥ 2 year	95	92.2
<b>Occupation (mother)</b>		
Work	44	31.2
Not working	97	68.2
<b>Income (mother)</b>		
Under Minimum Wage Deli Serdang (<Rp. 3.400.015)	131	92.9
Above Minimum Wage Deli Serdang (≥Rp. 3.400.015)	10	7.1
<b>Sex (Kids)</b>		
Boy	84	59.6
Girl	57	40.4
<b>Age (Kids)</b>		
Infants (0-2 years old)	78	55.3
Toddler (>2 -3 years old)	39	27.7
Pre schooler (>3-5 years old)	24	17.0

Based on table 1 above, the distribution of mothers and kids characteristic in Paluh Sibaji village, age at marriage of mothers was under 20 years old (61.0%). Based on parity, the majority of mothers were secundigravida (70.2%). There were 92.2% who have pregnancy distance ≥ 2 years. The majority of mothers did not work (68.2%), the majority of family income was under the Deli Serdang minimum wage (92.9%). Based on maternal education the majority was elementary school (42.6%). Furthermore, the gender of kids was predominantly boy (59.6%) with the majority of the kids were infants (0-2 years) (55.3%).

## Stunting Cases

The following is the distribution of toddlers with stunting cases

**Table 2. Toodler with stunting cases in Paluh Sibaji Village**

Stunting Cases	n	%
No Stunting	118	83,7
Stunting	23	16,3

Stunted kids in Paluh Sibaji Village was 23 toddlers (16.3%), stunting was determined based on the kid's height or body length compared to WHO standards (WHO, 2023).

## Clean Water And Drinking Water

A survey of 141 respondents showed that the majority of houses had their own clean water source (97.2%), the remainder used a shared water source belonging to neighbors. A total of 32.6% of mothers filter water because the physical quality did not meet the requirements. The main source of clean water came from dug wells for 22 people (15.6%), drilled wells for 33 people (23.4%), and municipal waterworks for 86 people (61.0%) according table 3 below. The results of measuring the quality of clean water in fulfilling the 4 aspects of drinking water can be explained in the table below.

**Table 3. Fulfillment of Four aspects in raw drinking water sources**

Category	n	%
Meets 4 requirements	38	27.0
Meets 3 requirements	31	22.0
Meets 2 requirements	67	47.5
Meets 1 requirements	5	3.5
<b>Total</b>	<b>141</b>	<b>100</b>

Based on the table distribution of clean water requirements based on Four aspect (quality, quantity, affordability and continuity) it can be seen that of the 141 mothers with toddlers there are 5 houses (3.5%) that meet the 1 requirement, and 38 houses (27.0%) meet 4 requirements. The distribution of compliance with the Four aspect in drinking water, it can be explained in table 4 below.

**Table 4. Distribution Of Compliance With Four Aspects In Raw Water Sources. Drinking Water**

Four aspects (Quality, Quantity, Continuity, Affordability) Clean Water	Not eligible		Eligible	
	n	%	n	%
Quality	54	39.4	83	60.6
Quantity	1	0.7	136	99.3
Continuity	64	46.7	73	53.3
Affordability	19	13.9	118	86.1

The results of table 4, 54 houses (39.4%) did not meet the quality requirements.

Furthermore, only 1 houses (0.7%) of the water quantity did not meet the requirements, 64 houses (46.7%) of the water continuity did not requirement, and 19 houses (13.9%) of mothers with toddlers did not meet the affordability requirements.

**Table 5. Statistical Test Results For Fulfillment Of The Four Aspects With The Incidence Of Stunting**

Four aspect	Stunting		Not Stunting		Total		<i>p-value</i>	OR (95%CI)
	n	%	n	%	n	%		
Did not meet requirements	18	18.2	81	81.8	99	100	0.187	2.593 (0.717-9.371)
Meet requirements	5	7.9	37	92.1	42	100		
<b>Total</b>	<b>23</b>	<b>16.3</b>	<b>118</b>	<b>83.7</b>	<b>141</b>	<b>100</b>		

The results of the chi-square test for the four aspect fulfillment of drinking water and the incidence of stunting obtained  $p$  value =0.187 ( $p>0.05$ ). This proves that there was no relationship between the fulfillment of the four aspect of drinking water and the incidence of stunting among toddlers in Paluh Sibaji village. A total of 18.2% of mothers with stunted toddlers did not meet the four aspects of drinking water, but it was also found that 7.9% of mothers were stunted but met the four aspects.

### Drinking Water Treatment

**Table 6. Relationship between Fulfillment of Drinking Water Requirements and Stunting Incidents among Toddlers in Paluh Sibaji Village**

Drinking water	Stunting		No stunting		Total		<i>p-value</i>	OR (95%CI)
	n	%	n	%	n	%		
No processing	10	25.6	29	74.4	39	100	0.064	2.361 (0.936-5.952)
With processing	13	12.7	89	87.3	102	100		
<b>Total</b>	<b>23</b>	<b>16.3</b>	<b>118</b>	<b>83.7</b>	<b>141</b>	<b>100</b>		

Based on the results of the chi square test between clean water treatment and the incidence of stunting, a value of  $p=0.064$  ( $p>0.05$ ) was obtained, proving that there was no significant relationship, even though 25.6% of stunted kids did not process clean water based on its quality. Based on the results of interviews with mothers who have kids, the source of drinking water that is consumed was processed first by boiling, 72.3% of the rest without processing.

## DISCUSSION

### The Relationship between Clean Water Quality and Stunting Incidents

The results of the chi-square test for the fulfillment four aspect of clean water and the incidence of stunting obtained a value of  $p=0.187$  ( $p>0.05$ ). This proves that there was no relationship between the fulfillment of the four aspect of clean water and the incidence of stunting among toddlers in Paluh Sibaji village. However, the aspect of clean water is a risk

factor for stunting in toddlers, families with aspects of clean water that do not meet the requirements have a risk of 2.593 times the risk of stunting compared to families who meet the aspects of clean water. This proves that stunting cases were not caused by fulfilling the four aspects of clean water, adequate sanitation is a risk factor for stunting (Shofifah et al., 2022). but other factors related to adequate sanitation can be the cause, such as the availability of latrines, the condition of wastewater disposal facilities and management. rubbish. Apart from that, direct factors related to the nutritional status of toddlers, consumption patterns and parenting patterns as well as other factors were not studied. In daily activities, the use of clean water is very important, namely for washing dishes, cutlery, and food ingredients for toddlers and families, the quality of clean water that does not meet the quality aspects will increase the risk of stunting in toddlers because the bacterial colonies contained in water move to food ingredients and reduce the nutritional value of the food. (Ravsanjanie et al., 2021).

The risk of infectious diseases such as diarrhea, environmental enteric dysfunction (EED) and helminthiasis will increase due to poor environmental sanitation factors, one of which is limited access to clean water, this can increase the incidence of stunting (Cumming & Cairncross, 2016; Headey & Palloni, 2019; Olo et al., 2021). A study conducted in South Africa found that toddlers with households that have access to clean water, proper toilet facilities are less likely to experience diarrhea than toddlers with households that do not have access to clean water (Omotayo et al., 2021).

In research conducted by Nisa et al (2021) it was found that respondents with poor clean water sanitation were 2,705 times more likely to experience stunting than respondents with good clean water sanitation. Clean water and sanitation are important things in everyday life, clean water plays a fairly high role in reducing stunting, reaching 60% (Shafira, 2021). Wahid et al research (2020) found that the factors that influence the incidence of stunting in children aged 2 years in Mamuju district are drinking water sources and drinking water processing (P-value = 0.046). Effective water, sanitation and hygiene (WASH) interventions carried out in low and middle income countries can reduce the level of nutritional deficiencies. The washing interventions they carry out are improving the quality of water and sanitation (Anyanwu et al., 2022).

### **The Relationship between Drinking Water Treatment and Stunting Incidents**

Drinking water processing in this research includes water filtration activities, storing water temporarily in reservoirs and boiling water. Drinking water treatment at the household level is one way to get safe drinking water to fulfill the quality of drinking water (Nizaruddin & Ilham, 2022).

The results of the statistical analysis in table 6 above, regarding drinking water treatment and the incidence of stunting in toddlers, can be seen that of the 39 mothers in the category of not processing drinking water, 10 mothers (25.6%) of their toddlers were stunted and 29 mothers (74.4%) of their toddlers were not stunted. However, it was also found that 13 mothers (12.7%) had stunted toddlers with a p-value of 0.064 ( $p > 0.05$ ), so that statistically it can be interpreted that there is no relationship between drinking water treatment and the incidence of stunting in toddlers in Paluh Sibaji Village, but, toddlers with families who do not treat clean water before consumption have a 2.361 times risk of stunting compared to toddlers with families who treat clean water before consumption.

Drinking water treatment was not the only action that can prevent or be a risk factor for stunting from the aspect of environmental sanitation, other factors and nutritional factors can be a cause of stunting in addition to maternal factors. Stunting research in Indonesia suggests that children from households with inadequate latrines and untreated drinking water may increase the risk of stunting (Beal et al., 2018). The results of this research were in line with research conducted by Permatasari et al (2021) which showed that 76 (89.4%) of the 85 informants had groups that carried out drinking water treatment in the short category. Meanwhile, there were 9 groups who did not carry out drinking water treatment in the very short category (10.6%) with a p-value of 0.173.

Water and sanitation that did not meet the requirements can have an impact on the absorption of nutrients in the digestive system. Coliforms are a marker for water being contaminated by pathogens or not being contaminated (Opu et al., 2021). For the parameters for the presence of coliforms in water, you have to look at the number of pathogens, even though there are microbes in the water it can still be consumed provided that the water to be consumed is treated. For households that treat drinking water before consumption, there are 102 households, either from refill water or other sources of drinking water, which means that processing drinking water is very important. This is in line with research by Paramasatya & Wulandari (2023) which states that a mother must maintain her child's nutrition from the womb, starting from processing drinking water before consumption. This is done in relation to the nutrition of the mother and child. Drinking water treatment can be done by filtering water from the tap or chlorinating it and boiling the water. There were 67 households (47.5%) with 14 children under five being stunted (20.9%) higher than households whose source of drinking water comes from municipal waterworks, and refill water. This is confirmed by research by Soraya et al (2022) regarding environmental sanitation studies on the incidence of stunting in the working area of the Simpang Tuan Community Health Center, East Tanjung Jabung



Regency, which obtained a p value of 0.010, indicating that there was a relationship between clean water facilities and the incidence of stunting in toddlers and toddlers who have the facilities. Poor clean water was 4,427 times more likely to be stunted compared to toddlers who have good clean water facilities. Therefore, it is necessary to pay attention to the quality of drinking water, starting from collection, processing until consumption later.

## CONCLUSIONS

From the results of research conducted on 141 toddlers in Paluh Sibaji village, it was concluded that 16.3% (23 toddlers) experienced stunting. There was no significant relationship between fulfilling the four aspects in drinking water, drinking water treatment with the incidence of stunting ( $P\text{-value} > 0.05$ ). however, fulfilment of the four aspects of drinking water and water treatment as a risk factor for stunting ( $OR > 1$ ).

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## REFERENCES

- Anyanwu, O., Ghosh, S., Kershaw, M., Cherinet, A., & Kennedy, E. (2022). Dietary Outcomes, Nutritional Status, and Household Water, Sanitation, and Hygiene (WASH) Practices. *Current Developments in Nutrition*, 6(4). <https://doi.org/https://doi.org/10.1093/cdn/nzac020>
- Bappenas. (2020). *Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2020-2024*. [https://perpustakaan.bappenas.go.id/e-library/file\\_upload/koleksi/migrasi-data-publikasi/file/RP\\_RKP/Dokumen RPJMN 2020-2024/Lampiran 1. Narasi RPJMN 2020-2024.pdf](https://perpustakaan.bappenas.go.id/e-library/file_upload/koleksi/migrasi-data-publikasi/file/RP_RKP/Dokumen RPJMN 2020-2024/Lampiran 1. Narasi RPJMN 2020-2024.pdf)
- Beal, T., Tumilowicz, A., Sutrisna, A., Izwardy, D., & Neufeld, L. M. (2018). A review of child stunting determinants in Indonesia. *Maternal and Child Nutrition*, 14(4), 1–10. <https://doi.org/10.1111/mcn.12617>
- Cumming, O., & Cairncross, S. (2016). Can water, sanitation and hygiene help eliminate stunting? Current evidence and policy implications. *Maternal and Child Nutrition*, 12, 91–105. <https://doi.org/10.1111/mcn.12258>
- Government Regulation Number 16 of 2005 concerning Development of Drinking Water Supply Systems
- Headey, D., & Palloni, G. (2019). Water, Sanitation, and Child Health: Evidence From Subnational Panel Data in 59 Countries. *Demography*, 56(2), 729–752. <https://doi.org/10.1007/s13524-019-00760-y>
- IUWASH. (2015). *Water Supply Vulnerability Assessment and Adaptation Plan PDAM Salatiga City Summary Report*. <https://adaptasi.ppi.menlhk.go.id/cms/storage/files/monev/dokumenadaptasi/60792bbde2b23.pdf>

- Kemenkes RI. (2022). Buku Saku Hasil Survei Status Gizi Indonesia (SSGI) Tahun 2022. *Kemenkes RI*. <https://www.badankebijakan.kemkes.go.id/buku-saku-hasil-survei-status-gizi-indonesia-ssgi-tahun-2022/>
- Kemenkes RI. (2023). *Buku Saku Hasil Survei Status Gizi Indonesia (SSGI) 2022*. <https://kesmas.kemkes.go.id/assets/uploads/contents/attachments/09fb5b8ccfd088080f2521ff0b4374f.pdf>
- Minister of Health Regulation No. 2 of 2023 meets health standards including physical, chemical, biological and radioactive quality.
- Minister of Public Works and Public Housing No. 29/PRT/M/2018 of 2018 on Technical Standards for Minimum Service Standards for Public Works and Public Housing
- Nisa, S. K., Lustiyati, E. D., & Fitriani, A. (2021). Sanitasi Penyediaan Air Bersih dengan Kejadian Stunting pada Balita. *Jurnal Penelitian Dan Pengembangan Kesehatan Masyarakat Indonesia*, 2(1), 17–25. <https://journal.unnes.ac.id/sju/index.php/jppkmi> URL: <https://journal.unnes.ac.id/sju/index.php/jppkmi/article/view/47243>
- Nizaruddin, N., & Ilham, M. I. (2022). The Effect of Sanitation on Stunting Prevalence in Indonesia. *Populasi Jurnal Kependudukan Dan Kebijakan*, 30(2), 34–51. <https://doi.org/10.22146/jp.80186>
- Olo, A., Mediani, H. S., & Rakhmawati, W. (2021). Hubungan Faktor Air dan Sanitasi dengan Kejadian Stunting pada Balita di Indonesia. *Jurnal Obsesi : Jurnal Pendidikan Anak Usia Dini*, 5(2), 1113–1327. <https://doi.org/10.31004/obsesi.v5i2.521>
- Omotayo, A. O., Olagunju, K. O., Omotoso, A. B., Ogunniyi, A. I., Otekunrin, O. A., & Daud, A. S. (2021). Clean water, sanitation and under-five children diarrhea incidence: Empirical evidence from the South Africa's General Household Survey. *Environmental Science and Pollution Research*, 28(44), 63150–63162. <https://doi.org/10.1007/s11356-021-15182-w>
- Opu, S., Hidayat, & Khaer, A. (2021). Hubungan Sanitasi Total Berbasis Masyarakat (STBM) dengan Upaya Penurunan Angka Stunting pada Balita (Studi Literatur). *Jurnal Sulolipu: Media Komunikasi Sivitas Akademika Dan Masyarakat*, 21(1), 140–152. <https://journal.poltekkes-mks.ac.id/ojs2/index.php/Sulolipu/article/view/1967/1432>
- Paramasatya, A., & Wulandari, R. A. (2023). Korelasi Akses Sanitasi Dan Akses Air Minum Dengan Kejadian Stunting Pada Balita Di Wilayah Kabupaten Serang Tahun 2022. *Jambura Journal of Health Science and Research*, 5(2), 695–706. <https://ejurnal.ung.ac.id/index.php/jjhsr/index>
- Permatasari, R., Soerachmad, Y., & Hasbi, F. (2021). Hubungan Kebiasaan Cuci Tangan Pakai Sabun Pengolahan Makanan Dan Air Minum Terhadap Kejadian Stunting pada Balita di Wilayah Kerja Puskesmas Kebunsari Kabupaten Polewali Mandar. *Journal Pegguruang: Conference Series*, 3(2), 768. <https://doi.org/10.35329/jp.v3i2.2517>
- PUPR. (2021). *Gambaran Umum Sistem Penyediaan Air Minum (SPAM)*. Kementerian Pekerjaan Umum dan Perumahan Rakyat. [https://nuwsp.web.id/download/pelatihan/pelatihan/2BB\\_GU\\_SPAM\\_Screen.pdf](https://nuwsp.web.id/download/pelatihan/pelatihan/2BB_GU_SPAM_Screen.pdf)
- Ravsanjanie, M. M., Pawitra, A. S., Diyanah, K. C., Zakaria, Z. A., & Marmaya, N. H. B. T. E. (2021). Utilization of Clean Water, Personal Hygiene of Toddler Caregivers, and Smoking Behavior of Family Members as Risk Factors for Cases of Stunting Toddlers. *Jurnal Kesehatan Lingkungan*, 13(1), 48–56. <https://doi.org/10.20473/jkl.v13i1.2021.48-56>
- Rosha, B. C., Susilowati, A., Amaliah, N., & Permanasari, Y. (2020). Penyebab Langsung dan Tidak Langsung Stunting di Lima Kelurahan di Kecamatan Bogor Tengah, Kota Bogor (Study Kualitatif Kohor Tumbuh Kembang Anak Tahun 2019). *Buletin Penelitian Kesehatan*, 48(3), 169–182. <https://doi.org/10.22435/bpk.v48i3.3131>

- Shafira, Z. (2021, October 25). *Air Bersih dan Sanitasi, Faktor Kunci Untuk Turunkan Stunting*. Greeners.Co.
- Shofifah, A., Sulistyorini, L., & Praveena, S. M. (2022). Environmental Sanitation at Home and History of Infection Diseases as Risk Factors for Stunting in Toddlers in Drokilo Village, Kedungadem District, Bojonegoro Regency. *Jurnal Kesehatan Lingkungan*, 14(4), 289–295. <https://doi.org/10.20473/jkl.v14i4.2022.289-295>
- 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>
- TNP2K. (2019). *Strategi Nasional Percepatan Pencegahan Anak Kerdil (Stunting)*. <https://stunting.go.id/stranas-p2k/>
- United Nations. (2023). *The Sustainable Development Goals Report 2023*. <https://unstats.un.org/sdgs/report/2023/>
- Wahid, N. K., Maria, I. L., & Hidayanty, H. (2020). Relationship Between Drinking Water Sources, Drinking Water Treatment and Sewage Management With Stunting In Two-Years-Old Children In Mamuju Regency. *EAS Journal of Nutrition and Food Sciences*, 2(4), 204–209. <https://doi.org/10.36349/easjnfs.2020.v02i04.005>
- WHO. (2023). *Length/height for age*. <https://www.who.int/tools/child-growth-standards/standards/length-height-for-age>