



Literature Study: Relationship Of Access To Clean Water And Drinking Water Quality With Stunting In Toddlers 2010-2020

Wening Septiyani¹, Sulistiyani Sulistiyani¹, Tri Joko¹

*¹Environmental Health Departement, Faculty of Public Health, Diponegoro University,
Prof. Soedarto Street No.1269, Semarang, Central Java, Indonesia
Email : sulistiyani@live.undip.ac.id*

Article details:

Received: 12th January 2021

Accepted: 19th January 2021

Published: 30th January 2021



Abstract

One goals of the Sustainable Development Goal or SDG's number two is to look for sustainable solutions to eliminate hunger and all forms of malnutrition in 2030, including stunting. The high rate of stunting in Indonesia is closely related to inadequate access to clean water and poor drinking water quality. This study aims to determine the relationship between access

to clean water and quality of drinking water on the incidence of stunting in toddlers. This literature search was carried out using the journal database, as Google Scholar, EBSCO Host, ProQuest, and Springerlink by using method of literature study. The keywords used to filter articles were relationship, access, quality, water, stunting, short, and toddler. The criterias include the publication period of the last 10 years, articles can be accessed in full text. There were 15,179 articles related to keywords and after screening with inclusion and exclusion criterias, there were 30 articles. The percentage results show that 64% of the results of the study stated that there was a relationship between access to clean water and the incidence of stunting in toddlers and 78% stated that there was a relationship between the quality of drinking water and the incidence of stunting in toddlers.

Keywords: *access, quality, water, stunting, toddlers*

To cite this article :

Wening Septiyani, Sulistiyani Sulistiyani, Tri Joko. 2021. "Literature Study: Relationship Of Access To Clean Water And Drinking Water Quality With Stunting In Toddlers 2010-2020." *International Journal of Health, Education and Social (IJHES)* 4, no. 1: 1–17.



Introduction

Stunting is a growth disorder that occurs especially during the development of toddlers. This also become a problem of nutrition in various countries, both in developed and developing countries. Data from WHO shows that around 178 million toddlers in the world are stunted (MCA, 2014). The condition of stunting in toddlers illustrates the status of low nutrition and lasts a long time during the toddler's development. Toddlers are declared stunted if they have Z-Score at height according to age less than -2 from the standard deviation (SD) based on the growth standard (Johnson, 2012).

The results of a study conducted to measure the nutritional status of toddlers conducted in 2019 in Indonesia reported a decrease from 30.8% to 27.67%. Three stunting can be caused by direct determinants such as maternal nutrition during pregnancy, infectious diseases suffered by toddlers, nutritional intake for toddlers, as well as indirect determinants such as water access, water quality, sanitation conditions, hygiene habits such as washing hands (Fund, 2017).

Water access and quality related to the incidence of stunting and nutritional status in toddlers through infection. Diarrhea and URI (Upper Respiratory Tract Infection) that many toddlers suffer delay the development process so it can result on stunting (Schmidt, 2014).

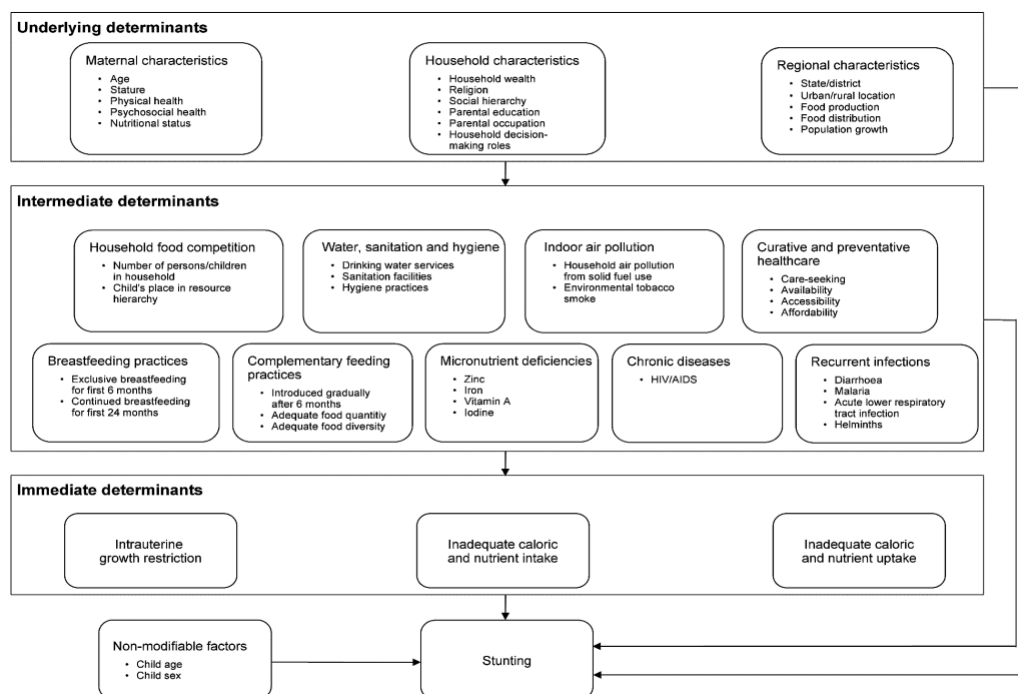


Figure 1. Conceptual framework for stunting (Akombi BJ,2017)

Based on the previous research, the result illustrated that toddlers who live in families with insufficient water sources and unprotected sera can experience stunting 1.35 times greater than toddlers who live in families with protected drinking water. The purpose of conducting a literature study in this study is to determine the relationship between access and quality water to incident stunting on toddler 2010 to 2020.

Methods

Search strategy

This research has been carried out using literature studies that use secondary data or articles related to access clean water and drinking water quality to the incidence of stunting in toddlers in the period 2010-2020. Literature searches were carried out on digital libraries, as Google Scholar, EBSCO Host, ProQuest, and Springerlink. Keywords in the article search included relationship, access, quality, water, stunting, stunted, and toddlers.



Selection criteria

The articles used were articles that fulfilled the inclusion and exclusion criterias. The inclusion criteria used were the publication period time of 2010-2020, articles fully accessible, and containing variables of access clean water and drinking water quality to stunting. Articles that have met the inclusion criteria are then filtered according to the exclusion criteria in the form of articles that use research methods other than case control, cross sectional, and cohorts and research subjects who are not toddler.

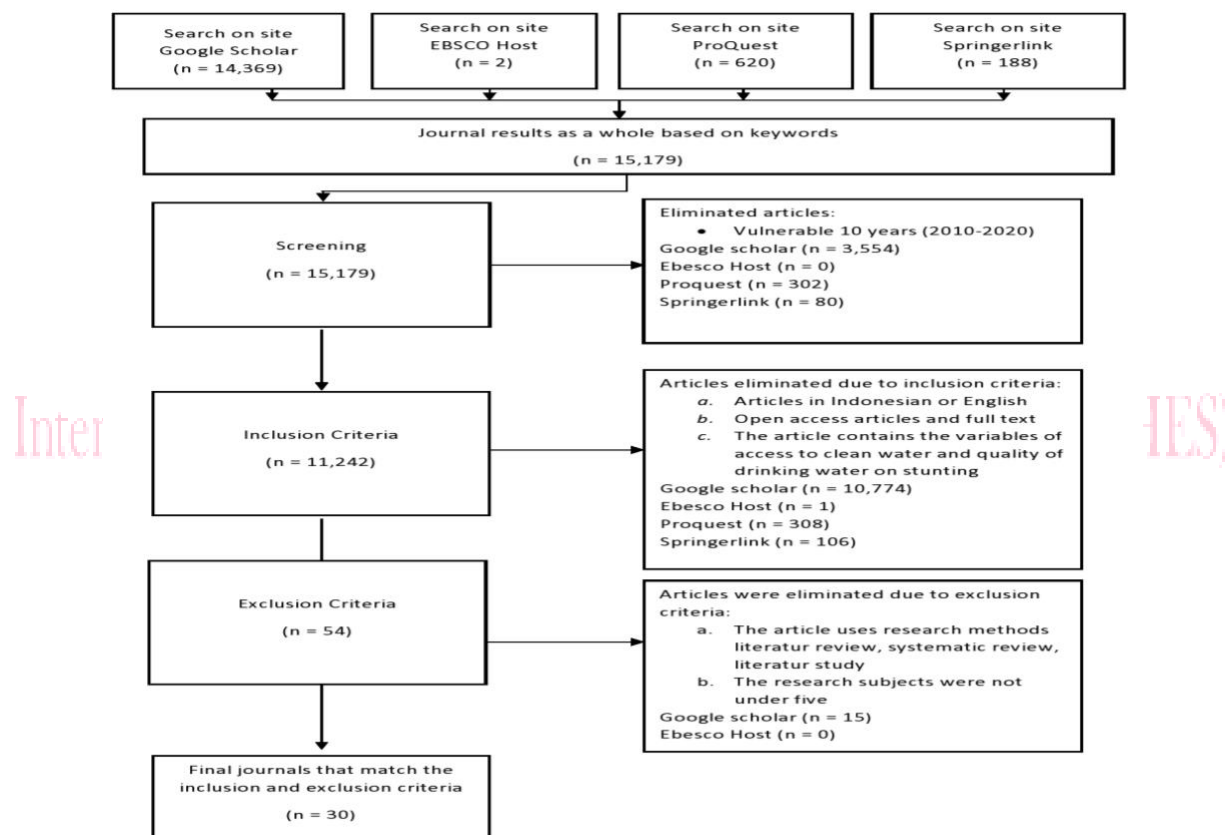


Figure 1. Flow chart literature



The International Journal of Health, Education and Social (IJHES)

Results

The results of screening articles that have been obtained using a flow chart and determination of inclusion and exclusion criteria were obtained 30 articles. All articles used an observational study in the form of a case control, cross sectional, or cohort study.

Tabel 1 Synthesis literature

No Article	The Junals Name	Purpose	Research sites	Research design	Total Sample	Measurement Method	Test Statistics	Results
1	<i>Journal of Maternal and Child Health</i> , 3 (2), pp. 105-118	Analyze the biopsychosocial determinants of stunting and wasting toddlers ¹¹	West Tulang Bawang Regency	Case control	150	Questionnaires, anthropometric tools	Multiple logistic regression analysis	51.3% of respondents have access to drinking water - Bivariate analysis of the relationship between access to clean water and stunting found no relationship and statistically insignificant (OR = 1.67; CL 95% 0.68 - 4.08; p = 0.259)
2	J-KESMAS: <i>Journal of Public Health</i> . 2019 Nov 30; 5 (2): 138-50.	Knowing the relationship between household environmental sanitation and the incidence of stunting toddlers ¹²	Polewali Mandar Puskesmas working area	Case control	110	Questionnaire	Simple logistic regression analysis	37.1% of respondents have access to clean water - The bivariate test results showed that the quality of drinking water and food had no relationship and there was no significant effect on stunting with value p > 0.05 with a value of OR = 2.019
3	<i>Journal of Health</i> . 2019 Nov 30; 10 (3): 413-21.	Analyzing the relationship between access to basic sanitation facilities and the incidence of stunting toddlers ¹³	East Lampung Regency	Case control	400	Questionnaire, observation	Multiple logistic regression analysis	114 (57%) control respondents already had access to clean water that met the requirements - Access to clean water sources is related and influences the incidence of stunting with OR = 5.99 (95% CI: 3.31-10.83)



The International Journal of Health, Education and Social (IJHES)

4	Keslingmas Bulletin. 2020 Mar 24; 39 (1): 1-5.	Knowing the significant level of influence between variables ¹⁴	The village hall of the gadang hall	Cross sectional	26	Questionnaires, observations, anthropometric tests	Chi Square	The quality of drinking water as evidenced by the level of E. coli in the water was simultaneously and significantly related to stunting with p value <0.05
5	Nutrition and Food Research. 2011; 34 (2): 223482.	Analyzing relationship between environmental sanitation, morbidity, and nutritional status of toddlers ¹⁵	Indonesia	Case control	43,162	Questionnaire	Chi Square	86.5% of families have boiled drinking water before consumption. This indicates that environmental sanitation is already good. The quality of drinking water is related to and has an effect on stunting with a p value of 0.01 and OR = 1.0 (CI: 0.94-1.08)
6	. International Journal for Equity in Health. 2019 Dec 1; 18 (1): 203.	Analyzing causes of malnutrition inequality in toddlers ¹⁶	India	Cross sectional	184,567	Survey	Chi Square	35% of households have access to safe drinking water. - Hail chi square shows a significant relationship with p value <0.05 - The results of the decomposition show that increased access to drinking water sources has a 3% contribution to socio-economic inequality in the stunting rate and 4% in toddler with underweight.
7	Makara Journal of Health Research. 2017; 21 (2): 1.	Identifying relationship between sanitation, hygiene, and stunting among toddlers ¹⁷	Indonesia	Cross sectional	9,688	Questionnaire and secondary data (Risksdes 2013)	Chi Square	The results of the bivariate analysis showed that there was a significant relationship between access to clean water sources and stunting in toddler, p value = <0.05



The International Journal of Health, Education and Social (IJHES)

8	SSM-population health. 2019 Dec 1; 9: 100469.	Identifying the causes of changes in the prevalence of stunting in toddlers ¹⁸	Indonesia	Cross sectional	15,349	Questionnaire	Chi Square	The results of the bivariate analysis showed that there was no significant relationship between access to clean water sources and stunting in toddler with a p-value > 0.05.
9	Babul Ilmi Multi Science Scientific Journal of Health. 2019; 10 (1).	know the relationship between the conditions of environmental sanitation hygiene (type of latrine, clean water sources, the incidence of diarrhea, the incidence of worms) with the incidence of stunting ¹⁹	South Sumatra	Case control	60	questionnaire	Simple logistic regression analysis	- Toddler who suffered from stunting were 43, 3% in the age range of 3.2 - 3.9 years, - The results of the bivariate test showed that there was an effect between the type of latrine, access to clean water sources and the incidence of stunting in toddlers OR = 0.130; 95% CI (0.041 - 0.412). However, there was no relationship between the incidence of worms and stunting.
10	InE3S Web of Conferences 2018 (Vol. 74, p. 09007). EDP Sciences.	analyze the relationship between water and sanitation and toddler's stunting ²⁰	Indonesia	Cross sectional	2,835	questionnaire	Chi Square	This study found that there was a significant relationship related to the quality of proper drinking water and stunting in toddlers with a p-value of 0.01
11	PLoS One. 2017 Aug 10; 12 (8): e0182363.	Analyzing factors related to stunting in toddlers in Bangui ²¹	Bangui (Africa)	Cross sectional	422	questionnaire	Chi Square	The factor that was significantly associated with stunting was access to clean water to stunting with a p value of 0.01 (<0.05), which means that there is a relationship between access to clean water and stunting.
12	The Lancet Global Health.	Knowing the effects of access to WASH	Bangladesh	Cross sectional	14,425	questionnaire	Chi Square	The results of this study found that access to clean water, sanitation,



The International Journal of Health, Education and Social (IJHES)

	2018 Mar 1; 6 (3): e302-15.	and nutrition interventions on diarrhea and toddler's development ²²							and hand washing were not associated with linear growth including stunting with a p value> 0.05.
13	International Conference of Agricultural Economist Vancouver	Explain the determinants of malnutrition in toddlers in Malawi using an econometric-based tool ²³	Malawi	Cross sectional	7810	Survey, Anthropometric Test	Chi Square	- The univariate test results showed toddlers with stunting were 3763 or 48.1%, while access to clean water had reached 78.7%. - The bivariate test showed no relationship between access to clean water and stunting with a p value of 0.337 or p> 0.05	
14	Food and nutrition bulletin. 2017 Dec; 38 (4): 542-53.	To identify predictor factors for stuning in toddlers ²⁴	Uganda	Case control	168	Questionnaire	Simple logistic regression analysis	The results of the study indicate that toddler in the household with inadequate access to clean water are twice as likely to be stunted for toddler who have adequate access to water (OR: 2.0, 95% CI: 0.2-18.7)	
15	The Lancet Global Health. 2018 Mar 1; 6 (3): e316-29.	Analyzing the effects of access to water, sanitation, hand washing, and nutrition interventions on diarrhea and development of rural children ²⁵	Kenya	Cross sectional	6583	Questionnaire	Chi Square	The results of the analysis showed that the group of toddlers with access to clean water, sanitation and hand washing, water, sanitation, and hand washing had no correlation with linear growth including stunting with p value> 0.05.	
16	PloS one. 2017 Dec 20; 12 (12): e0189106.	Identifying determinants of	Southern Ethiopia	Case control	465	Questionnaire	Simple logistic	Unsafe drinking water quality (AOR = 7.06, 95% CI; 4.40-	



The International Journal of Health, Education and Social (IJHES)

		stunting toddlers ²⁶	among					regression analysis	20.42) was significantly associated with stunting. This means that the quality of drinking water is related and has an influence on the incidence of stunting in toddlers.
17	In4th International Symposium on Health Research (ISHR 2019) 2020 Feb 22 (pp. 24-28). Atlantis Press.	Knowing the relationship between environmental health factors and the prevalence of stunting in toddlers ²⁷	the Bali	Case control	202	Questionnaire	Simple logistic regression analysis		- Logistic regression shows that access to water is not related and there is no significant effect on the incidence of stunting in toddlers. Access to water (OR: 2.069, 95% CI: 0.8-4.8) p value: 0.093 - Water quality (OR: 0.779, 95% CI: 0.3-1.5) p value 0.480
18	BMC public health. 2018 Dec 1; 18 (1): 74.	Knowing the key determinants of editing in Congo ²⁸	Congo	Cross sectional	9,030	Survey	Chi Square		The chi square results showed insignificant value> 0.05 (not related) of access to clean water to stunting
19	Maternal & child nutrition. 2018 Jan; 14 (1): e12434.	Identifying factors that contribute to the incidence of stunting in toddlers ²⁹	Nepal	Cross sectional	4853	Survey, Anthropometric Test	Chi Square		Toddler from households with an unhygienic environment or unprotected drinking water quality were associated with the incidence of stunting with the p value of the chi square test result of <0.05
20	PloS one. 2013 Nov 4; 8 (11): e78692.	Analyze comprehensively the determinants of stunting in toddlers ³⁰	India	Cross sectional	12,174	Questionnaire	Chi Square		Access to clean water is associated with a significance value <0.05 and contributes 2% to the incidence of stunting among toddlers in India.
21	Maternal & Child Nutrition.	Check whether Household access to	Papua, Klaten.	Cross sectional	1450	Survey	Chi Square		26% (374 toddlers) were stunted.



The International Journal of Health, Education and Social (IJHES)

	2020 Aug 24: e12741.	improved sanitation facilities and drinking water sources is associated with stunting ³¹	NTT (Indonesia)						Household access to clean water sources has insignificant value with p value> 0.05, which means it is not associated with childhood stunting.
22	Ibadan Journal of Agricultural Research Vol. 12 (2)	Determine the effect of access to drinking water and sanitation on the health of toddlers in rural Nigeria using the 2008 Demographic and Health Survey (DHS) data ³²	Nigeria	Case control	13,571	Survey	Probit regression analysis	The findings in this study indicate that access to adequate clean water sources is associated with the nutritional status of toddlers such as stunting, wasting, and malnutrition with a p-value <0.05 and has a significant effect. Unsafe drinking water can cause diarrhea in toddlers.	
23	BMC public health. 2016 Dec 1; 16 (1): 669.	Identifying factors that cause stunting in toddlers in Indonesia ³³	Klaten, Sikka, Jayawijaya (Indonesia)	Cross sectional	1366	Questionnaire	Chi Square	- The quality of drinking water is related to stunting with a p value of 0.019. - Sanitation and access to clean water have a significant relationship with a p value of 0.007 (<0.05)	
24	BMC public health. 2017 Dec 1; 17 (1): 110.	Knowing the relationship between water, sanitation, and child growth ³⁴	Ethiopia, India, Peru, Vietnam	Cohort	7,715	Questionnaire, anthropometric test	Multiple logistic regression analysis	Household access to clean water and proper sanitation is related to the incidence of stunting with p value = 0.01 and RR value = 2.19	
25	Demography. 2019 Apr 15; 56 (2): 729-52.	Verify the relationship between sanitation and toddler's health	Countries in Latin America, Africa,	Case control	> 1000 Demographic health	Survey, observation	Multiple logistic regression analysis	Increasing access to water with pipes has a significant effect on stunting with an OR value of 0.092, this also means that there is a relationship between the two.	



The International Journal of Health, Education and Social (IJHES)

		from a data panel of 59 countries ³⁵	Asia and Europe		survey reports			Improved sanitation predicted a large reduction in the prevalence of diarrhea and child mortality but was not associated with changes in stunting or wasting.
26	BMC nutrition. 2018 Dec 1; 4 (1): 51.	Knowing the factors that contribute to high stunting ³⁶	Zambia	Cross sectional	12,328	Survey	Chi Square	- The prevalence of stunting among toddlers in Zambia is 40%. - The quality of drinking water is related to the incidence of stunting in toddlers in Zambia with a p value of 0.016
27	Journal of Global Health Science. 2019 May 27; 1 (1).	know the relationship between water and sanitation (WATSAN) and stunting in toddlers ³⁷	Philippines	Cross sectional	2584	survey	Chi Square	53.9% of our sample was stunted at 2 years of age and only 26.8% had access to improved WATSAN. - Access to clean water is associated with stunting with a p-value <0.01).
28	InIOP Conference Series: Earth and Environmental Science 2019 Oct (Vol. 344, No.1, p. 012009). IOP Publishing.	Knowing the effect of drinking water, sanitation, and solid waste management with stunting in toddlers ³⁸	Indonesia	Cross sectional	2,571	Survey	Chi Square	- The results of the chi square analysis showed significance with a p value <0.05 between access to clean water and stunting in toddlers. - It can be stated that there is a relationship between access to clean water and the incidence of stunting in toddlers.
29	International Journal of Epidemiology	Investigating the relationship between toddler	70 developing countries	Cross sectional	1,198,558	Survey	Chi Square	Access to clean water is associated with stunting in toddlers with p value <0.05



The International Journal of Health, Education and Social (IJHES)

	2011; 40: 1196–1204	health care and access to water and sanitation ³⁹							
30	BMC Pediatrics (2020) 20: 134	Knowing the relationship and interaction between WASH and malnutrition in toddlers ⁴⁰	Nepal	Cross sectional	2352	Survey	Chi Square	- RTs that practice water purification are 430 (18.3%). - There was a significant relationship in the statistical test of the interaction between drinking water quality and the incidence of stunting with a p value of 0.001	



International Journal of Health, Education and Social (IJHES)



Table 2. Distribution of literature frequency based on the variables

	Variables discussed	
	Frequency	Percent
Access to clean water	21	70%
Drinking water quality	8	27%
Both	1	3%
Total	30	100%

Based on the table above, it can be seen that as many as 21 articles discussing relationship of access to clean water to the incidence of stunting in toddlers. Furthermore, 8 articles were found discussing about relationship of drinking water quality with the incidence of stunting in toddlers and found 1 article discussing the two variables in his research.

Table 3 Literature frequency distribution based on research design

	Access to clean water		Drinking water quality	
	Frequency	Percent	Frequency	Percent
Cross sectional	14	64%	5	56%
Case control	7	32%	4	44%
Cohort	1	5%	0	0%
total	22	100%	9	100%

Based on the results of the synthesis above, of the 30 articles, most of the articles used a cross sectional study design or research method. In variable access to clean water, there were 22 articles in which 64% used cross sectional, 32% used case control, and 5% used cohort study design. Meanwhile, articles discussing the second variable the quality of drinking water, found 9 articles with 56% of them using cross-sectional and 44% using case control.



Table 4 Frequency distribution based on results

	Access to clean water		Drinking water quality	
	Frequency	Percent	Frequency	Percent
Related	14	64%	7	78%
Not related	8	36%	2	22%
total	22	100%	9	100%

The results of the synthesis also showed that 64% of the research results stated that there was a relationship between access to clean water and the incidence of stunting in toddlers and 78% stated that there was a relationship between the quality of drinking water and the incidence of stunting in toddlers.



Discussion

Access to clean water associated with the incidence of stunting in toddlers

Access to clean water is one of the basic human needs to fulfill healthy living standards. People who are fulfilled by the need for clean water will avoid diseases that spread through water and have a quality life. For this reason, the Government's National Medium Distance Development Plan (RPJMN) 2020-2024 focuses on increasing targets for access to sustainable sanitation and clean water. The RPJMN has a target of 100% access to safe drinking water and providing access to piped drinking water by building 10 million household connection pipes (Ministry of National Planning and Development, 2020).

Indonesian basic health research showed that stunting can be caused by malnutrition (40%) and the absence of clean water and poor sanitation (60%). The proportion of stunting that is mostly found in developing countries such as Malawi which reaches 48.1% of toddlers are stunted, Congo which found 42.7% of its sample of toddlers were stunted both mild, moderate and severe stunting, Nepal at 37.9%, and in Albuko City, Ethiopia found 39.3 % of toddlers are stunted. (Kismul, 2018)



In this literature study, there were 22 articles discussing the relationship between the variable access to clean water and 64% of them showed a relationship with the incidence of stunting in toddlers. The results of the study that showed insignificant results were research conducted in Tulang Bawang Barat and Malawi where as many as more than 50% of the respondents had access to good drinking water 2018 with the case control method shows OR = 5.99 (95% CI: 3.31-10.8) which indicates that toddlers who do not have access to good clean water can be at risk of experiencing stunting by 5.99 times greater than toddlers who have access to good clean water (Rahayu, 2018).

Stunting as a form of growth disruption in toddlers caused by multidimensional factors, like a poor parenting practices, limited quality health services and early learning, lack of access to nutritious food, and lack of access to clean water and sanitation. Limited access to clean water makes toddlers forced to use water as they can. If the clean water that comes in does not meet the eligibility requirements, it can increase bacteria or viruses that enter the body and increase the intensity of the occurrence of infectious diseases in toddlers. Infection that often occurs such as diarrhea or intestinal worms causes the intake of nutrients to be wasted without proper absorption and there is a difference between the amount of nutrients needed by the body and the amount of nutrients absorbed (Badriyah, 2013). If this nutritional deficiency continues to occur, it can cause malnutrition and cause growt toddler slows down. Therefore it is important for every family to have a source of clean water to maintain the health of the family, including their toddlers so that they can grow and develop optimally (Bhutta 2013).

Stunting prevention has been widely discussed by the government and contained in several programs including the stunting prevention program through two interventions, as specific nutrition interventions and sensitive nutrition interventions. Specific nutrition interventions are efforts to directly prevent and reduce nutritional problems. This activity is generally carried out by the health sector. Activities carried out include immunization, supplementary feeding for pregnant women and toddlers at the Integrated Healthcare Canter. Specific targets for the *1000 first day of life group* (pregnant women, breastfeeding mothers and toddlers), while sensitive nutrition



interventions are indirect efforts to prevent and reduce nutritional problems. These activities are generally carried out by the non-health sector. Its activities include the provision of clean water, poverty reduction activities, women's empowerment, and others. The target is the general public. What has been done by the non-health sector in implementing sensitive nutrition interventions is intervention in the field of environmental health and community empowerment as well as assistance in overcoming poverty problems (Indonesian Minister of Health, 2017).

In overcoming nutritional problems, sensitive interventions contributed 70 percent while specific interventions contributed around 30 percent.⁴³ Therefore, the RPJMN, which targets 100% access to proper water and sanitation, is expected to be able to accelerate the reduction in the prevalence of stunting in Indonesia and increase the contribution of socio-economic improvement by 3 % (Mzumara, 2019).

Drinking water quality is related to the incidence of stunting in toddlers

Drinking water quality is closely related to the Minister of Health Regulation No. 416 of 1990 regarding requirements and quality control which was then updated in Regulation of the Minister of Health No 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements for Hygiene Purposes Sanitation, Swimming Pools, Solus Per Aqua, and Public Baths. The regulation has explained the quality requirements or quality standards for healthy water, which is for sanitation hygiene purposes. Contamination of water or not achieving adequate drinking and food water can inhibit growth and cause stunting (Bhutta ZA, 2013).

There were 9 research articles found related to the quality of drinking water on the prevalence of stunting in toddlers. From these articles, 77% of the articles stated that there was a relation between drinking water quality and the incidence of stunting in toddlers. A study conducted in Nepal with 4,853 respondents revealed that toddler who come from households with unprotected drinking water or that do not meet the water quality requirements have a 7-35% chance of stunting or experiencing stunting (Dorsey JL, 2018).

The use of inadequate water for cooking or drinking along with the lack of availability of latrines is the main cause of infection. Both of these can increase the risk of the toddler having



repeated diarrhea or an increase in the intensity of the infection. The relationship between the consumption of inadequate water and stunting lies in the number of microorganisms (such as pathogens and E. Coli bacteria) in dirty water which when consumed can disrupt the system in the human body. The results of research conducted in Padang showed that the level of E. Coli in clean water sources had a simultaneous and significant effect on the incidence of stunting with a beta coefficient value of 0.391 and indirectly affected the duration of diarrhea with a beta coefficient value of 0.396. Diarrhea and worms became one of the diseases that lurk due to inadequate water quality. Toddlers who often experience diarrhea will have a 1 times greater chance than toddlers with normal conditions or toddlers with good nutritional status.

If this happens for a long time, and the diarrhea recurs, then a lot of fluids and micronutrients (essential nutrients) are wasted from the child's body. Zinc is one of them. When the body is deficient in zinc, the intestines that are disrupted during diarrhea cannot be regenerated. Based on research, zinc deficiency in childhood can lead to stunting and delayed maturity of sexual function (Hidayati, 2019).

A study in Polewali Mandar, West Sulawesi Province and other studies conducted in 3 different provinces in Indonesia also showed that the management of drinking water and food in households had a double effect on the incidence of stunting in toddlers (Rah, 2020). Management of safe drinking water and food in households (PAMM-RT) can be done in a simple way, as processing drinking water by boiling water. Family can drink water after letting it boil for 3-5 minutes. Boiling water is useful for killing disease-causing microorganisms. The place for drinking water needs to be considered, such as the availability of a cover, it is kept in a clean place that is difficult to reach by animals, it must always be cleaned at least 3 times a week to maintain the quality of drinking water.

Conclusion and Recommendation

The results of the literature study found that 21 articles discussed the variable access to clean water against stunting, 8 articles discussed the relationship between drinking water quality



and stunting, and 1 article discussed both. The percentage of 22 articles found that 64% stated that there was a relationship between access to clean water and the incidence of stunting in toddlers and from 9 articles 78% stated that there was a relationship between drinking water quality and the incidence of stunting in toddlers. The results of the literature analysis show a relationship between access to clean water and quality of drinking water with the incidence of stunting in toddlers.

Elimination stunting for toddlers should also pay attention to environmental factors such as water, hygiene, and sanitation and accelerate the fulfillment of access to clean water, especially in Indonesia and monitoring the quality of drinking water at the household level, such as conducting periodic surveys by the health center or local health offices.

References

1. Badriyah LU, Syafiq A. The association between sanitation, hygiene, and stunting in children under two-years (an analysis of Indonesia's Basic Health Research, 2013). Makara Journal of Health Research. 2017; 21 (2): 1.
2. Batiro B, Demissie T, Halala Y, Anjulo AA. Determinants of stunting among children aged 6-59 months at Kindo Didaye woreda, Wolaita Zone, Southern Ethiopia: Unmatched case control study. PloS one. 2017 Dec 20; 12 (12): e0189106.
3. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, Webb P, Lartey A, Black RE, TL Group, Maternal and Child Nutrition Study Group. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost ?. The lancet. 2013; 382 (9890): 452-77.
4. Bukusuba J, Kaaya AN, Atukwase A. Predictors of stunting in children aged 6 to 59 months: a case – control study in Southwest Uganda. Food and nutrition bulletin. 2017 Dec; 38 (4): 542-53.
5. Dearden KA, Schott W, Crookston BT, Humphries DL, Penny ME, Behrman JR. Children with access to improved sanitation but not improved water are at lower risk of stunting compared to children without access: a cohort study in Ethiopia, India, Peru, and Vietnam. BMC public health. 2017 Dec 1; 17 (1): 110.
6. Dorsey JL, Manohar S, Neupane S, Shrestha B, Klemm RD, West Jr KP. Individual, household, and community level risk factors of stunting in children younger than 5 years: Findings from a national surveillance system in Nepal. Maternal & child nutrition. 2018 Jan; 14 (1): e12434.
7. Dwipayanti NM, Sutiari NK, Dewiyan CI, Mulyawan KH. Potential Association of



- Sanitation Factors on Stunting Incidences Among Children Under Age 5 in Bali Province, Indonesia. In 4th International Symposium on Health Research (ISHR 2019) 2020 Feb 22 (pp. 24-28). Atlantis Press.
8. Fenske N, Burns J, Hothorn T, Rehfuess EA. Understanding child stunting in India: a comprehensive analysis of socio-economic, nutritional and environmental determinants using additive quantile regression. *PloS one*. 2013 Nov 4; 8 (11): e78692.
 9. Fink G, Günther I, Hill K. The effect of water and sanitation on child health: evidence from the demographic and health surveys 1986–2007. *International journal of epidemiology*. 2011 Oct 1; 40 (5): 1196-204.
 10. Fund. SDG Baseline Report on Children in Indonesia Jakarta: BAPPENAS and UNICEF. 2017
 11. Gafur A, Azwar M, Yulis DM. Knowledge of Mother Toddlers in Stunting Control in South Sulawesi. *UNM Environmental Journals*. 2020; 3 (2): 60-8.
 12. Hasan A, Kadarusman H. Access to basic sanitation facilities as a risk factor for stunting among toddlers aged 6-59 months. *Journal of Health*. 2019; 10 (3): 413-21.
 13. Hasanah I, Susanti H. Does water and sanitation effects on children's physical development? Evidence from Indonesia Family life Survey (IFLS) 2014. In *E3S Web of Conferences 2018* (Vol. 74, p. 09007). EDP Sciences.
 14. Headey D, Palloni G. Water, sanitation, and child health: evidence from subnational panel data in 59 countries. *Demography*. 2019 Apr 15; 56 (2): 729-52.
 15. Hidayat TS, Fuada N. Relationship between Environmental Sanitation, Morbidity and Nutritional Status of Toddlers in Indonesia (Relationship Between Environmental Sanitation, Morbidity And Nutritional Status Of Under-Five Children In Indonesia). *Nutrition and Food Research*. 2011; 34 (2): 223482.
 16. Hidayati MN, Perdani RR, Karima N. The Role of Zinc in Child Growth. *Majority Journal*. 2019; 8 (1): 168-71
 17. Ihsan A, Riviwanto M, Darwel D. Effect of Clean Water Sources, Latrines, and Parenting Patterns on Stunting in Toddlers with Diarrhea as an Intervening Variable. *Keslingmas Bulletin*. 2020; 39 (1): 1-5.
 18. Ihsan A, Riviwanto M, Darwel D. Effect of Clean Water Sources, Latrines, and Parenting Patterns on Stunting in Toddlers with Diarrhea as an Intervening Variable. *Keslingmas Bulletin*. 2020; 39 (1): 1-5.
 19. Irianti S, Prasetyoputra P, Dharmayanti I, Azhar K, Hidayangsih PS. The role of drinking water source, sanitation, and solid waste management in reducing childhood stunting in Indonesia. In *IOP Conference Series: Earth and Environmental Science 2019 Oct* (Vol. 344, No.1, p. 012009). IOP Publishing.
 20. Johnson, W., Vazir, S., Fernandez-Rao, S., Kankipati, VR, Balakrishna, N., & Griffiths, PL Using the WHO 2006 child growth standard to assess the growth and nutritional status of rural south Indian infants. *Annals of human biology*. 2012; 39 (2), 91-101
 21. Kim R, Subramanian SV, Orav EJ, Fawzi WW. The role of water and sanitation, diarrheal



- infection, and breastfeeding on child stunting: insights from a historical analysis of the Cebu longitudinal health and nutrition survey, 1984–1986. *Journal of Global Health Science*. 2019 May 27; 1 (1).
22. Kismul H, Acharya P, Mapatano MA, Hatløy A. Determinants of childhood stunting in the Democratic Republic of Congo: further analysis of the 2013–14 Demographic and Health Survey. *BMC public health*. 2018 Dec 1; 18 (1): 74.
 23. Luby SP, Rahman M, Arnold BF, Unicomb L, Ashraf S, Winch PJ, Stewart CP, Begum F, Hussain F, Benjamin-Chung J, Leontsini E. Effects of water quality, sanitation, handwashing, and nutritional interventions on diarrhea and child growth in rural Bangladesh: a cluster randomized controlled trial. *The Lancet Global Health*. 2018 Mar 1; 6 (3): e302-15.
 24. Maganga M, Maganga A. Determinants of Nutrition Outcomes in Under-five Children: Experiences from Malawi.
 25. MCA- Indonesia 2014. Community Based Health and Nutrition to Reduce Stunting Project, MCA-Indonesia Version 01. 2014.
 26. Minister of Health RI. Number 32 of 2017 concerning Environmental Health Quality Standards and Water Health Requirements for Sanitation Hygiene Needs. Swimming Pool, Solus Per Aqua and Public Bath.
 27. Ministry of National Planning and Development / National Planning and Development Agency. Tenocratic Draft National Medium Term Development Plan 2020–2024.
 28. Ministry of National Planning and Development / National Planning and Development Agency. Guidelines for Implementing Integrated Stunting Reduction Interventions in Districts / Cities in 2018. Jakarta: Bappenas; 2018.
 29. Mzumara B, Bwembya P, Halwiindi H, Mugode R, Banda J. Factors associated with stunting among children below five years of age in Zambia: evidence from the 2014 Zambia demographic and health survey. *BMC nutrition*. 2018 Dec 1; 4 (1): 51.
 30. Nasrul, Hafid, F., Thaha, AR & Syria. Risk Factors for Stunting Ages 6-23 Months in Bontoramba District, Jeneponto Regency. *Health Media. Masy. Indonesia*. 2015; 11, 139–146.
 31. Null C, Stewart CP, Pickering AJ, Dentz HN, Arnold BF, Arnold CD, Benjamin-Chung J, Clasen T, Dewey KG, Fernald LC, Hubbard AE. Effects of water quality, sanitation, handwashing, and nutritional interventions on diarrhea and child growth in rural Kenya: a cluster-randomized controlled trial. *The Lancet Global Health*. 2018 Mar 1; 6 (3): e316-29.
 32. Ogunsola GO, Omonona BT. Effect of Access to Potable Water and Sanitation on Health of Under-five Children in Rural Nigeria.
 33. Rah JH, Sukotjo S, Badgaiyan N, Cronin AA, Torlesse H. Improved sanitation is associated with reduced child stunting amongst Indonesian children under 3 years of age. *Maternal & Child Nutrition*. 2020 Oct; 16: e12741.
 34. Rahayu RM, Pamungkasari EP, Wekadigunawan CS. The biopsychosocial determinants of stunting and wasting in children aged 12-48 months. *Journal of Maternal and Child Health*. 2018; 3 (2): 105-18.



35. Ramdaniati SN, Nastiti D. Relationship between Toddler Characteristics, Mother's Knowledge and Sanitation on Stunting Incidence in Toddlers in Labuan District, Pandeglang Regency. *Hearty: Journal of Public Health*. 2019; 1: 7 (2).
36. Rizal MF, van Doorslaer E. Explaining the fall of socioeconomic inequality in childhood stunting in Indonesia. *SSM-population health*. 2019 Dec 1; 9: 100469.
37. Schmidt, Charles W. "Beyond malnutrition: the role of sanitation in stunted growth". 2014; A298-A303.
38. Shrestha SK, Vicendese D, Erbas B. Water, sanitation and hygiene practices associated with improved height-for-age, weight-for-height and weight-for-age z-scores among under-five children in Nepal. *BMC pediatrics*. 2020 Dec; 20 (1): 1-0.
39. Sinatrya AK, Muniroh L. The relationship between water, sanitation, and hygiene (WASH) factors and stunting in the working area of the Kotakulon Health Center, Bondowoso Regency. *Amerta Nutrition*. 2019; 3 (3): 164-70.
40. Singh S, Srivastava S, Upadhyay AK. Socio-economic inequality in malnutrition among children in India: an analysis of 640 districts from the National Family Health Survey (2015–16). *International Journal for Equity in Health*. 2019; 18 (1): 203.
41. Soeracmad YS. The Relationship between Household Environmental Sanitation and the Incidence of Stunting in Toddlers at the Wonomulyo Community Health Center, Polewali Mandar Regency in 2019. *J-KESMAS: Public Health Journal*. 2019; 5 (2): 138-50.
42. Torlesse H, Cronin AA, Sebayang SK, Nandy R. Determinants of stunting in Indonesian children: evidence from a cross-sectional survey indicating a prominent role for the water, sanitation and hygiene sector in stunting reduction. *BMC public health*. 2016; 16 (1): 669.
43. Uliyanti, Tamtomo, DG & Anantanyu, S. Factors Associated with the Incidence of Stunting in Toddlers Age 24-59 Months. *J. Vocational Health*. 2017; 3, 1–11.
44. United Nations Children's Fund. *Approach to Nutrition Programming for the East Asia - Pacific Region*. 3. 2014.
45. Vonaesch P, Tondeur L, Breurec S, Bata P, Nguyen LB, Frank T, Farra A, Rafai C, Giles-Vernick T, Gody JC, Gouandjika-Vasilache I. Factors associated with stunting in healthy children aged 5 years and less living in Bangui (RCA). *PLoS One*. 2017 Aug 10; 12 (8): e0182363.
46. Zairinayati Z, Purnama R. Relationship of Environmental Hygiene and Sanitation with Stunting in Toddlers. *Babul Ilmi Multi Science Scientific Journal of Health*. 2019; 10 (1).