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The Relationship Household Environmental Sanitation with Incidence of Stunting in Toddlers: Literature Review

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ABSTRACT

Introduction: Stunting (Short Children) one of the nutritional problems faced in the world, especially in poor and developing countries. Stunting is a problem because the impact it has can affect the quality of human resources and be detrimental to the world of health, including increasing morbidity and mortality rates. Sub optimal brain development results in delay in motor skills and mental growth. Many studies have been conducted on the risk factors for stunting in toddlers, including environmental sanitation which is an indirect cause stunting incident.

Objective: The Study aims to describe relationship between household environmental sanitation with the incidence of stunting toddlers.

Method: This research uses a systematic review method to summarize research results over the last 5 years. The data source comes from Indonesian Environmental Health Journal and the google scholar jurnal with the keywords "Stunting and environment". The selected articles are results of research related to environmental sanitation factors and behavior that cause stunting.

Result: There are 7 for 10 research article showed a significant relationship between household environmental sanitation and the incidence of stunting in toddlers.

Conclusion: Based on the results of studies conducted in 10 Journals, information was obtained that those related to the incidence of stunting in toddlers include acces to clean water and drinking water, unhealthly latrines, food intake, processing of waste and household liquid waste that does not requirements, mother's education level, parenting pattern for toddlers, exclusive breastfeeding and incidence of infection or diarrhea.

Keywords: Environmental Sanitation; Toddlers; Stunting

INTRODUCTION

Stunting is a condition in which linear growth disorders occur due to chronic energy intake deficiencies and occurs frequently in developing countries, including Indonesia (1). Nutritional problems are closely related to factors environment. The environment is one of the indicators in assessing the degree of human health and the home environment is an important part of family health including important evaluation materials to support optimal health for both individual families and family units (2). Low access to family sanitation, as well as environmental-based diseases are the main causes of death in Indonesia, especially in infants and toddlers, and contribute to more than 80% of diseases suffered by infants and toddlers, including infectious disease, appetite disorders, digestive tract disorders and other accompanying diseases (3).

Poor environmental sanitation conditions can result in infectious diseases in toddlers such as diarrhea and worms which can interfere with the digestive process and absorption of nutritional intake in the body. Some infectious disorders suffered by toddlers cause drastic weight loss. If this happens within a period of time which for a long time can result in stunting in children (2). Environmental sanitation is defined as the health status of an environment that includes several aspects of basic sanitation (such as access to clean water and drinking water, family toilets, places or facilities for disposing of garbage and household liquid waste) and the behavior of the house's occupants (4).

Environmental sanitation can be an indicator of supporting factors for increasing incidence of infectious diseases (5). The trigger fo stunting comes from several factors such as poor environmental sanitation. Factors from environmental sanitation that can influence the occurrence of stunting are the availability of clean water, waste management, availability of healthy latrines and waste management. If sanitation condition is bad, it can cause the prevalence of stunting cases to increase (6). Prevalence of environmental health that affects stunting occurred in 2017 (72.04%) households that have access to clean water and healthy toilets (67.89%). Based on height/age measurement data from the recap of stunting data in Februari-Desember 2022 from the Kendal II Health center as many as 415 toddlers who have been measured are stunted (6). Some children who often experience digestive infection or diarrhea due to poor water sanitation increase the presence of diarrhea or infectious disorders in children, causing malabsorption of food at the same time due to diarrhea cases, resulting in children having difficulty eating which further worsens the nutritional condition of toddlers. Conversely, malnutrition can cause children to be susceptible to diarrhea due to lack of nutrients, the child's immune system becomes weak and not optimal (4).

According to research (5) several factors related to the occurrence of stunting in children include the type of toilet and clean water sources. Research conducted by Wahdaniyah (2022) using case control research design showed the results that there was a meaningful relationship (p value: 0,000) between environmental sanitation and the incidence of stunting in toddlers (7). Sanitation and acces to clean water (2020) are one of the focuses that you can do to prevent stunting in children (8,9) Several environmental factors that are at risk for stunting in children are toddlers who come from families who have clean water facilities that do not requirements and this has a higher risk of diarrhea and stunting prevalence (10). The risk of stunting in children living in conditions poor environmental sanitation is higher compared to children who live in families with good water sanitation. This happens because most of the place where children's live do not requirements for healthy, there is no safe garbage disposal that is closed and waterproof, does not have a healthy toilet, and socio-economic factors that are classified as less able (10).

METHOD

This study uses a systematic review method to summarize research results over the past 5 years. This type of research is a literature review. Data sources come from relevant quality journals and are obtained through various scientific research sources. Data retrieval is carried out via the internet, namely the Indonesian Environmental Health Journal (JKLI) and Google Scholar with the keywords "Stunting and Environment". Journal searches are carried out through databases: Google Scholar and Diponegoro University Journal. The selection of articles is also based on the Observational research design.

The population in the study was research on the environment and stunting risk factors conducted from 2015 to 2023, the initial data or information on jurnal articles identified was 25 articles then filtered according to the tittle and relevant research topic so that 10 research jurnals were selected which sourced from scientific publications on environmental health, nutrition as well as public health. The research sample size was 10 journals. The inclusion criteria used are: 1) Research published in the 2015-22024 period. 2) Has the research theme about environmental sanitation and stunting. 3) Having risk factors for toddlers with quiet significant stunting incident. The quantitative data collected then analyzed systematically to obtain discussion topic that are appropriate to the literature review.

RESULTS

There are 10 Journals that requirement for conducting a literature review and them there are 7 variables that cause stunting in toddlers.

Table 1. Journal Synthesis Results Table

Title	Researcher (Year)	Method	Results
Kajian Sanitasi Lingkungan Terhadap Kejadian *Stunting* di Wilayah Kerja Puskesmas Simpang Tuan Kabupaten Tanjung Jabung Timur (1)	Soraya, Ilham, Hariyanto (2022)	Cross-sectional observational quantitative research design.	Based on the results of the study, it is known that one of the direct causes of *stunting* is infectious diseases. This study shows that infectious diseases in the Simpang Tuan Health Center Work Area in 2021 were diarrhea in toddlers as many as 789 cases, worms 432 cases, ARI 984 cases. Meanwhile, infectious diseases can be caused by poor environmental sanitation. The coverage of environmental sanitation in the Simpang Tuan Health Center work area in 2020 is still relatively low. The coverage of clean water sanitation is 57.1%, healthy toilet facilities are 68.7%, waste water disposal facilities are 58.7% and household waste management is 54.8%.
Environmental factors related to children diagnosed with *stunting* 3 years ago in Salatiga City, Central Java, Indonesia. (11)	Nurjazuli, Budiyono, Mursid Raharjo, Nur Endah Wahyuningsih, (2023).	Cross-sectional observational research design.	The assessment of toddler *stunting* status in 2021 was dominated by *stunting* conditions (22%) with *z scores* of −3 to <−2 standard deviations (SD), followed by severe stunting conditions (8%) with z scores <−3 SD. The study showed that environmental factors did not contribute to stunting. However, boiled water is considered a risk factor for stunting. Our analysis shows that exclusive breastfeeding is correlated with stunting and provides a protective factor for toddler *stunting*.
Childhood *stunting* and cognitive effects of water and sanitation in Indonesia. (12)	Lisa Cameron, Claire Chase, Sabrina Haque, George Joseph, Rebekah Pinto, Qiao Wang. 2021	Using data from a sample of over six thousand children in the Indonesia Family Life Survey (IFLS), a socio-economic panel of household's representative of over 80 percent of Indonesia's population, we examine the association between poor households and community water and sanitation services and childhood *stunting* and cognitive development.	We found that children living in households with access to improved sanitation when they were under 2 years old were 5 percentage points less likely to be stunted. Community sanitation levels also matter. Children living in open defecation-free communities during this critical developmental window were more than 10 percentage points less likely to be stunted, compared to children in communities where all other households defecated in the open. Furthermore, cognitive test scores were negatively affected by open defecation.
Analisis Hubungan Antara Sanitasi Lingkungan dengan Kejadian Stunting di Kecamatan Cepu, Kabupaten Blora, Jawa Tengah. (13)	Maudy Risma, Prehatin Trirahayu, Sulistiyani (2022)	Analytical observational research with case control research design	The factor causing stunting is the food intake received by toddlers, namely the results of the test value, *p value* energy intake on stunting is 0.03 or <0.05. Environmental health factors are not related to the type of infection that causes *stunting.* The majority of toddlers in the case group have a history of infection and are susceptible to stunting.

Title	Researcher (Year)	Method	Results
Association of Exclusive Breastfeeding and Environmental Sanitation with the Incidence of Stunting in Toddlers Age 24-59 Months. (14)	Siti Nursofiati, Lili Amaliah, Annisa Nuradhiani (2023)	This research is quantitative research using cross-sectional design. The sampling technique used is purposive sampling	The results of the bivariate analysis showed that the *p-value* obtained was 0.043 (<0.05), which means that there is a significant relationship between exclusive breastfeeding and the incidence of *stunting* in toddlers aged 24-59 months in Sukadana Village, Ciomas District. The results of the bivariate analysis showed that the *p-value* obtained was 0.728 (≥0.05), which means that there is no significant relationship between environmental sanitation and the incidence of *stunting*.
Association between water, sanitation and hygiene (WASH) and child undernutrition in Ethiopia: a hierarchical approach.(15)	Sahiledengle, Biniyam Petrucka, Pammla Kumie, Abera Mwanri, Lillian Beressa, Girma Atlaw, Daniel Tekalegn, Yohannes Zenbaba, Demisu Desta, Fikreab Agho, Kingsley Emwinyore	Secondary data analysis was conducted based on the Ethiopian Demographic and Health Survey (EDHS) conducted from 2000 to 2016. A total of 33,763 recent live births extracted from the EDHS reports were included in the current analysis. Multilevel logistic regression models were used to investigate the association between WASH and child malnutrition. Relevant factors from the EDHS data were identified after an extensive literature review.	The overall prevalence of *stunting* and wasting was 47.29% [95% CI: (46.75, 47.82%)] and 10.98% [95% CI: (10.65, 11.32%)]. Children from households with inadequate toilet facilities [AOR: 1.20, 95% CI: (1.05,1.39)], open defecation [AOR: 1.29, 95% CI: (1.11,1.51)], and living in households with dirt floors [AOR: 1.32, 95% CI: (1.12,1.57)] were associated with higher odds of stunting. Children from households with unsafe drinking water sources were significantly less likely to be wasted [AOR: 0.85, 95% CI: (0.76,0.95)] and have stunted growth [AOR: 0.91, 95% CI: (0.83, 0.99)].
Water, hygiene and sanitation practices are associated with stunting among children of age 24-59 months in Lemo district, South Ethiopia, in 2021: community based cross sectional study. (16)	Woldesenbet, Biruk., Tolcha, Alemu., Tsegaye, Berhan	A community-based cross-sectional study was conducted from 1-30 January 2021. Data were collected from a total of 415 randomly selected children and their mothers/guardians. *Logistic regression* analysis was conducted to identify factors associated with stunting in children.	Water, hygiene and sanitation practices are associated with stunting among children of age 24-59 months in Lemo district, South Ethiopia, in 2021: community based cross sectional study.
Hubungan Pendidikan Ibu, Praktik Pengasuhan Dan Sanitasi Lingkungan Dengan Kejadian *Stunting* Pada Balita Di Desa Lokus Stunting Wilayah Kerja Puskesmas Paron Kabupaten Ngawi. (17)	Qurotul Ainin, Yunus Ariyanto, Citra Anggun Kinanthi (2021)	Analytical observational research with a case control research design.	Based on the results of the statistical test, a p-value of 0.002 was obtained (*p-value* ≤ 0.05) with an OR of 4.429, which means that there is a relationship between maternal education and the incidence of *stunting* in toddlers in the *stunting* locus village in the Paron Health Center working area, Ngawi Regency in 2019-2022.

Title	Researcher (Year)	Method	Results
			Based on the results of the statistical test, *p-value* of 0.001 (p-value ≤ 0.05) with an OR of 6.833 was obtained, which means that there is a relationship between parenting practices and the incidence of *stunting* in toddlers in the stunting locus village in the Paron Health Center working area of Ngawi Regency in 2022. Based on the results of the statistical test, *p-value* of 0.042 was obtained (*p-value* ≤ 0.05) with an OR of 4.529, which means that there is a relationship between environmental sanitation and the incidence of *stunting* in toddlers in the stunting locus village in the Paron Health Center working area of Ngawi Regency in 2022.
Hubungan Antara Kesehatan Stunting Di Wilayah Puskesmas Hubungan Antara Kesehatan Lingkungan Dengan Kejadian Stunting Di Wilayah Puskesmas Kalasan Kabupaten Sleman. (18)	Dewi Mustika Khoirun Nisa, Tri Wahyuni Sukesi (2023)	Analytical observational research with a case control research design.	The results showed no significant relationship between clean water sources (*p value* = 1,000; OR = 1,000 (CI 0.56-17.41), physical quality of clean water (*p value* = 1,000; OR = 0.47 (CI 0.04 = 1,000; OR = 1.31 (CI 0.31-5.53), and hand washing habits (*p value* = 1,000; 4.88) with the incidence of stunting. significant between clean water sources (*p value* = 1,000; = 1,000; OR = 0.47 (CI 0.04-5.72), ownership = 1,000; OR = 1,000 (CI Results: The results showed no relationship OR = 1,000 (CI 0.56-17.41), physical quality of clean water (latrines (*p value* = 1,000; OR = 1.31 (CI 0.31 0.20-4.88) with stunting incidents.
Pengaruh Indeks Risiko Sanitasi Terhadap Kejadian *Stunting* di Kecamatan Moyo Utara. (19)	Iga Maliga, Herni Hasifah, Rafi'ah, Gladeva Yugi Antari, Ana Lestari (2021)	Analytical observational study with a cross-sectional design was conducted in March 2021 in North Moyo District, Sumbawa Regency, NTB. Samples were taken using a simple random sampling technique with calculations using the Slovin formula with a 5% error rate, a sample of 40 people was obtained.	Respondent characteristics show that the majority of children affected by *stunting* are female 60%, the rest are male. The age range of 3-4 years dominates the age of children of respondents who suffer from *stunting* as much as 40%, and the most minority is in the age range of 0-2 years at 10%. The majority of respondents are housewives as much as 52.5%. Based on the results of the Sanitation Risk Index analysis using EHRA, sanitation in the study area is included in the category of high and very high sanitation risk. The results of the linear regression test show that there is a significant influence between sanitation risk and the incidence of stunting during the pandemic with a significance value.

Based on the table above the research results of 7 articles show that environmental sanitation is related to the incidence of stunting in toddlers, while 3 articles state that environmental sanitation or health is not a risk factor for stunting in toddlers. In Addition, the research results revealed that environmental sanitation factors in general were most related to the incidence of stunting as mentioned in 6 articles. In particular, 3 articles highlighted risk factors for drinking water related to stunting, 3 articles on aspects of healthy latrines, 1 article on infectious diseases, 1 article on factors related to food intake, 1 article on the affects of exclusive breastfeeding and 1 article each on parenting style and level

of Mother's education. The aspect of environmental sanitation that is most related to the incidence of stunting in toddlers in the quality of drinking water and the ownership of healthy latrines. According to the research conducted in Rwanda, Africa (2023), it is stated that the availability of safe drinking water reduces the possible risk of stunting, families who do not have acces to healthy toilets have a higher risk of toddlers stunting (20).

DISCUSSION

Access to Clean Water and Drinking Water

According to research by the Ministry of Health (Kemkes), stunting is caused by the lack of clean water and poor sanitation 60% (21). The clean drinking water crisis is a cause of child growth problems due to poor waste management which affects water source pollution. Clean drinking water is a factor disease infection that affect children's growth and development problems. Drinking water is a predictor of toddler stunting (22). Communities that do not have access to clean drinking water are at risk of health problems, especially stunting. Clean water prevents the development of diseases that together with sanitation and cleanliness can prevent the number of toddlers who are sick and have an impact on nutritional status (23). According to the research (2024) respondent whose water source for sanitation does not meet the requirements are 5.78 times more likely to be stunted. Following the computations, it was discovered that families who have a water supply for sanitation but the quality of drinking water does not fulfill the requirements had a 21% (probability 0.21) risk of stunting (24).

Unhealthy Toilet

Poor sanitation is a factor that can cause stunting related to the possibility infectious disease. Healthy latrines are a good means of disposing of faeces to stop the chain on disease spread. Latrines that meet health requirements do not cause direct spread of human waste and can prevent disease carrying vectors in latrine users and the surrounding environment (25). One of the areas of household environmental sanitation is a healthy toilet (26). Use Unsanitary toilet facilities contribute to an increase in infectious diseases such as diarrhea and worms, which results in impaired linear growth which can pose a risk of stunting in toddlers (26). A healthy toilet is a toilet that does not pollute water sources and is > 10 meters from drinking water sources, is odorless and cannot be reached by vectors or pests. Toilets must be watertight, equipped with walls and have adequate ventilation and lighting and clean water. The benefits and functions of a healthy toilet are to protect public health from disease, protect from aesthetic and odor disturbances, protect from the development of vectors or pest insects and environmental-based diseases, one of which is stunting (27). According to the research (2023) the study shows that children who reported diarrhea 2 weeks before the study, those from household with no toilets and those that shared toilets had higher odds of stunting. This association linked to open defecation resulting in fecal contamination of food and water, especially untreated water which fuels diarrheal illness and reduces the rate of attainment of development millestone among children (20).

Food Intake

Nutritional problems are one of the problems that often occur in public health. An example of this problem is malnutrition, where malnutrition causes 2.6 million babies in the world to die each year. These nutritional problems cause stunting. Triggers for stunting can come from various things, one of which is a lack of nutritious and high-protein food intake (28). Food intake in children is very important because it affects growth and development such as weight, age and height. According to the research (2021) the current problem of stunting in toddlers is also generally caused by eating difficulties including the mother's lack of knowledge regarding nutrition that must be fulfilled during the child's growth period. Phenomenon what happens is that the mother's nutritional knowledge has an impact on her role in preparing family meals, as well as parenting and child care. The mother's formal education influences the mother's level of knowledge, the higher the level mother's knowledge to absorb practical knowledge in formal and non formal environments, so that mother's can process, present and share as needed (29).

Household Waste and Liquid Waste Processing

Every human activity certainly produces waste or garbage whose amount and volume are proportional to the level of consumption of goods or materials used daily. Therefore, it needs to be managed so that it does not cause negative impacts on humans and the environment. Household waste management is managed starting from its source, namely households. Domestic waste water is waste water that comes from businesses and/or residential activities, restaurants, offices, businesses, apartments, and dormitories. Waste water is certainly something that needs to be considered because it has the potential to pollute the environment which can then have a negative impact on living things including humans, one of which is a risk factor for environmental-based diseases that have the potential to cause stunting in toddlers (30). According to the research (2021) there is a relationship between waste disposal and stunting (p value = 0.004) the relationship is reflected in the percentage of families with low waste disposal that have stunted toddlers (32.8%) compared to families with healthy waste disposal (9.1%). Meanwhile from the results of data, there is a relationship

between hosehold between waste and stunting (p value = 0,041). The existence of relationship is reflected in the percentage of family's unhealthly household liquid waste (30.5%) having stunted toddlers compared to families with household liquid waste that meet healthy criteria (13.3%) (31).

Exclusive Breastfeeding

Inadequate breastfeeding is one of the factors contributing to the high prevalence of stunting (32). Baby nutrition at birth in the form of colostrum and exclusive breastfeeding have been carried out but have not been balanced with adequate complementary feeding which is at risk of stunting problems. Exclusive breastfeeding can affect the incidence of stunting because if a baby who is not yet 6 months old is given food other than breast milk, it will cause the baby's intestines to be unable to digest food and the baby is susceptible to disease due to lack of intake (33). Based on the research results that there is relationship between exclusive breastfeeding and the incidence of stunting where most babies stop being exclusively breastfed when they are 2-3 months (34).

Infection Events

According to the the research (2021) stunting is connected to both recurrent infections and inadequate nutrition. It can currently be cause by a variety of factors, including inadequate nutrition and recurrent infection. The complicated condition known as stunting can have many causes, with the most common being an imbalance and inadequate diet and a lack of vitamins and other micronutrients (35). Disease Infection still haunts the health of toddlers in Indonesia and other developing countries. Infection can be related to malnutrition in several ways, namely affecting appetite, causing loss of food, and can also affect the metabolism of the food. Poverty and unhealthy environments with poor sanitation will be the beginning of infectious diseases and the risk of stunting in toddlers (36).

CONCLUSION

Based on the results of a study conducted on 10 journals obtained information that factors related to stunting in toddlers include access to clean water and drinking water, unhealthy toilets, food intake, processing of household waste and liquid waste that does not meet requirements, mother's education level, parenting pattern for toddlers, exclusive breastfeeding and the occurrence of infection or diarrhea. The government needs to pay attention to improving environmental health in reducing the incidence of stunting as one of the handlings of sensitive aaspects, not just nutritional factors. Innovation related to environmental sanitation engineering is needed in handling stunting and hopefully in the future other research will be carried out on other aspects or variables so that stunting handling can be optimal.

REFERENCES

1. Adrian Lutfi Raedjani, "Jurnal Pembangunan," J. Pembang. Sos., vol. 7, no. 1, pp. 53–63, 2022, [Online]. Available: https://www.academia.edu/download/98280497/3758.pdf
2. Teja M., "Stunting Balita Indonesia Dan Penanggulangannya," Pus. Penelit. Badan Keahlian DPR RIus Penelit Badan Keahlian DPR RI., vol. 11(22), pp. 13–18, 2022.
3. Pemerintah Kabupaten Jepara, "No Title," Strategi Komunikasi Perubahan Perilaku Dalam Percepatan Penurunan Stunting di Kabupaten Jepara. p. 4, 2022.
4. Kemenkes RI, "Cegah Stunting dengan Perbaikan Pola Makan, Pola Asuh dan Sanitasi [Internet]," 2023.
5. UNICEF, Penuntun Hidup Sehat. Jakarta: Kementrian Kesehatan RI, 2018.
6. A. M. R. A. Salsabila, Suhartono, and Nurjazuli, Relationship Between Environmental Sanitation and Stunting Incidents in Toddlers in Work Area of Kendal II Public Health Center, no. ICoHPS. Atlantis Press International BV, 2023. doi: 10.2991/978-94-6463-324-5_53.
7. W. Wahdaniyah, Nurpatwa Wilda Ningsi2, and D. S. Diesna Sari, "Hubungan Sanitasi Lingkungan Dengan Kejadian Stunting Pada Baduta Di Kabupaten Majene," Bina Gener. J. Kesehat., vol. 13, no. 2, pp. 39–48, 2022, doi: 10.35907/bgjk.v13i2.233.
8. T. Beal, A. Tumilowicz, A. Sutrisna, D. Izwardy, and L. M. Neufeld, "A review of child stunting determinants in Indonesia," Matern. Child Nutr., vol. 14, no. 4, pp. 1–10, 2018, doi: 10.1111/mcn.12617.
9. T. Vaivada, N. Akseer, S. Akseer, A. Somaskandan, M. Stefopulos, and Z. A. Bhutta, "Stunting in childhood: An overview of global burden, trends, determinants, and drivers of decline," Am. J. Clin. Nutr., vol. 112, pp. 777S-791S, 2020, doi: 10.1093/ajcn/nqaa159.
10. Ariyanti S., "Analisis faktor risiko kejadian stunting pada anak balita di wilayah kerja puskesmas muara tiga kabupaten pidie (Tesis)," 2015.
11. W. N. Nurjazuli, Budiyono, Raharjo M, "Environmental factors related to children diagnosed with stunting 3 years ago in Salatiga City , Central Java , Indonesia. Toxicol Anal Clin [Internet]," pp. 1–8, 2023.

12. W. Q. Cameron L, Chase C, Haque S, Joseph G, Pinto R, "Childhood stunting and cognitive effects of water and sanitation in Indonesia," p. 40, 2021.
13. U. Jember, "Repository Universitas Universitas Jember".
14. S. Nursofiati, L. Amaliah, and A. Nuradhiani, "Hubungan Pemberian ASI Eksklusif dan Sanitasi Lingkungan dengan Kejadian Stunting pada Balita Usia 24-59 Bulan," J. Gizi Kerja dan Produkt., vol. 4, no. 2, pp. 151–159, 2023, doi: 10.52742/jgkp.v4i2.197.
15. et al Sahiledengle B, Petrucka P, Kumie A, Mwanri L, Beressa G, Atlaw D, "Association between water, sanitation and hygiene (WASH) and child undernutrition in Ethiopia: a hierarchical approach," BMC Public Health, vol. 22(1), p. 14309, 2022.
16. T. B. Woldesenbet B, Tolcha A, "Water, hygiene and sanitation practices are associated with stunting among children of age 24-59 months in Lemo district, South Ethiopia, in 2021," community based cross Sect. study, no. BMC Nutr, pp. 9(1):95–105, 2023.
17. Q. Ainin, Y. Ariyanto, and C. A. Kinanthi, "Hubungan Pendidikan Ibu, Praktik Pengasuhan Dan Sanitasi Lingkungan Dengan Kejadian Stunting Pada Balita Di Desa Lokus Stunting Wilayah Kerja Puskesmas Paron Kabupaten Ngawi," J. Kesehat. Masy., vol. 11, no. 1, pp. 89–95, 2023, doi: 10.14710/jkm.v11i1.35848.
18. T. W. S. Nisa, Dewi Mustika khoirun Nisa, "Jurnal Stunting 2022_JKLI," Hub. antara Kesehat. Lingkung. dengan Kejadian Stunting di Wil. Puskesmas Kalasan kabupaten Sleman.
19. I. Maliga, H. Hasifah, G. Y. Antari, R. Rafi'ah, and A. Lestari, "Pengaruh Indeks Risiko Sanitasi Terhadap Kejadian Stunting di Kecamatan Moyo Utara," J. Kesehat. Lingkung. Indones., vol. 21, no. 1, pp. 50–58, 2022, doi: 10.14710/jkli.21.1.50-58.
20. C. Kalinda et al., "Socio-demographic and environmental determinants of under-5 stunting in Rwanda: Evidence from a multisectoral study," Front. Public Heal., vol. 11, 2023, doi: 10.3389/fpubh.2023.1107300.
21. Kemenkes RI, "Riset Kesehatan Dasar," no. Kementrian Kesehatan Republik Indonesia, 2021.
22. Wulan N., "Analisis Karakteristik Ibu, Perilaku Akses Air Minum Dan Sanitasi Layak Terhadap Kejadian Stunting Balita Di Kabupaten Keroom," vol. 3, p. 14, 2022.
23. Kemenkes RI, "Cegah Stunting dengan Perbaikan Pola Makan, Pola Asuh dan Sanitasi," Kemenkes RI.
24. Z. Zahtamal, R. Restila, S. Sundari, and R. Palupi, "the Influence of Environmental Sanitation on Stunting," J. Kesehat. Lingkung., vol. 16, no. 1, pp. 59–67, 2024, doi: 10.20473/jkl.v16i1.2024.59-67.
25. Nisa S, "Sanitasi Penyediaan Air Bersih dengan Kejadian Stunting pada Balita," J Penelit Dan Pengemb Kesehat Masy. Indones., vol. 2 (1), pp. 17–25, 2021.
26. Fheron Gurusinga, "Faktor Hubungan sanitasi lingkungan dengan kejadian stunting pada balita di wilayah kerja Puskesmas Merdeka," p. 1, 2023.
27. Kemenkes RI, Peraturan Menteri Kesehatan Republik Indonesia Nomor 2 Tahun 2023 Tentang Peraturan Pelaksanaan Peraturan Pemerintah Nomor 66 Tahun 2014 Tentang Kesehatan Lingkungan. Jakarta, 2023.
28. S. Ramayulis R., Krisnawan , T., & Iwaningsih, "Stop stunting dengan Konseling Gizi," vol. Penebar Pl, p. Jakarta, 2018.
29. S. Manggabarani, R. R. Tanuwijaya, and I. Said, "Journal of Nursing and Health Science DOI : www.ejournal.stikes-pertamedika.ac.id/index.php/jnhs ISSN : 2809-2370 Volume 1 Nomor 1 , Edisi Oktober 2021 KEKURANGAN ENERGI KRONIK , PENGETAHUAN , ASUPAN MAKANAN DENGAN STUNTING : CROSS-SECTIONAL STUDY Chronic," J. Nurs. Heal. Sci., vol. 1, pp. 2–8, 2021.
30. Kementerian Kesehatan RI, "Pedoman Pelaksanaan Sanitasi Total Berbasis Masyarakat (STBM)," J. Kebijak. dan Manaj. Publik, vol. 3, no. 2, pp. 44–53, 2023.
31. R. Mariana, D. D. Nuryani, C. A. Fakultas, K. Masyarakat, and U. Malahayati, "Hubungan sanitasi dasar dengan kejadian stunting di wilayah kerja puskesmas Yosomulyo kecamatan Metro pusat kota Metro tahun 2021," J. community Heal. issues, vol. 1, no. 2, pp. 58–65, 2021.
32. Hasan A, "Air Minum, Sanitasi, dan Hygiene sebagai Faktor Risiko Stunting di Wilayah Pedesaan," vol. 13(2), pp. 299–307, 2022.
33. N. D. Ramdaniati S, "Hubungan Karakteristik Balita, Pengetahuan Ibu Dan Sanitasi Terhadap Kejadian Stunting Pada Balita Di Kecamatan Labuan Kabupaten Pandeglang," vol. 7(2), pp. 47–54, 2019.
34. M. R. Pratama and S. Irwandi, "Hubungan Pemberian Asi Eksklusif Dengan Stunting Di Puskesmas Hinai Kiri, Kecamatan Secanggang, Kabupaten Langkat," J. Kedokt. STM (Sains dan Teknol. Med., vol. 4, no. 1, pp. 17–25, 2021, doi: 10.30743/stm.v4i1.65.
35. I. U. Haq et al., "Prevalence of Micronutrient Deficiencies among Preschool and School-Going Children in Flood-Hit Areas of Pakistan," Am. J. Trop. Med. Hyg., vol. 105, no. 6, pp. 1638–1644, 2021, doi: 10.4269/ajtmh.21-0705.
36. W. Handayani, "Psikologi Keluarga," no. Jakarta, p. Pustaka Utama, 2006.