JPPIPA 11(2) (2025)

Jurnal Penelitian Pendidikan IPA

Journal of Research in Science Education

http://jppipa.unram.ac.id/index.php/jppipa/index

Study of Household Environmental Sanitation Risk Factors on Stunting Incidence in Toddlers in Dongos Village, Kedung I Health Center Working Area, Jepara Regency

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Received: August 05, 2024
Revised: December 10, 2024
Accepted: February 25, 2025
Published: February 28, 2025

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DOI: 10.29303/jppipa.v11i2.9967

Abstract: Stunting is a condition of linear growth disorders due to chronic lack of intake and occurs in many developing countries including Indonesia. Stunting is a problem because it is associated with an increased risk of illness and death, suboptimal brain development so that motor development is delayed and mental growth is inhibited, this can hinder the Indonesian government's program towards a superior and quality golden generation in 2045. The purpose of this study was to determine the risk factors for household environmental sanitation on the incidence of stunting in toddlers in Dongos Village, Kedung I Health Center, Jepara Regency. This study is an observational analytical study using a quantitative method with a case-control study design, namely a study comparing case and control groups and then retrospectively examining risk factors that might explain the incidence of stunting. The study sample was stunted and non-stunted toddlers, calculated using lemmeshow formula with the absolute accuracy proportion estimate with a total sample of 100 respondents divided into 50 case groups and 50 control groups. Data analysis with Chi Square test then further using logistic regression test using prediction modeling. The results of the study showed that unsafe household waste management has a risk factor of 3.6 times greater for stunting in toddlers (p-value 0.029; Odds Ratio = 3.632; 95% CI = 1.082-12.183). Houses with unsafe household waste management have a 5.2 times greater risk of experiencing stunting in toddlers (p-value 0.025; Odds Ratio = 5.268; 95% CI = 1.077- 25.779). Household toilet ownership (p value = 0.400) and household drinking water consumption patterns (p value = 0.338) were not proven to be risk factors for stunting in toddlers in Dongos Village, Kedung I Health Center working area, Jepara Regency.

Keywords: Environmental sanitation; Risk factors; Stunting; Toddlers

Introduction

Stunting is a major health problem for children worldwide, especially in poor and developing countries (Goudet et al., 2019). According to the United Nations International Children's Emergency Fund (UNICEF), globally one in three children under five years old experience stunting and 40% of these toddlers live in rural areas (IFPRI, 2015). Poor sanitation can invite infectious diseases in toddlers such as diarrhea and worms which can interfere with the digestive process in absorbing nutrients. Some infectious diseases suffered by babies can cause the baby to lose weight. If this condition occurs for a long time, it can result in stunting problems (Teja, 2019). Environmental sanitation is defined as the health status of an environment that includes the criteria for a healthy home, the provision of basic sanitation facilities (such as clean water, toilet

How to Cite:
Anwar, W., Nurjazuli, & Joko, T. (2025). Study of Household Environmental Sanitation Risk Factors on Stunting Incidence in Toddlers in Dongos Village, Kedung I Health Center Working Area, Jepara Regency. *Jurnal Penelitian Pendidikan IPA*, *11*(2), 542–547. https://doi.org/10.29303/jppipa.v11i2.9967

facilities, household wastewater disposal facilities and trash bins) and the behavior of residents (Apriasih & Chanty, 2023; Trinanda, 2023).

Toddlers who come from families with inadequate clean water facilities have a higher prevalence of diarrhea and stunting than those who live in homes with adequate clean water facilities (Ariyanti, 2015). The risk of stunting in children who live in poor environmental sanitation conditions is higher than in children who live in good water sanitation conditions (Kwami et al., 2019; Mbuya & Humphrey, 2016; Shofifah et al., 2022; Vilcins et al., 2018). This happens because most of the children's homes do not meet the requirements for a healthy home, there is no closed and watertight waste disposal site, they do not have a family toilet, and this is supported by the relatively low economic conditions of the family (Ariyanti, 2015). Based on research, it has been proven that the problem of stunting is not only a problem of nutritional intake but also includes environmental health problems, namely the use of clean water and ownership of household toilets (Unicef, 2012).

Environmental health indirectly affects the nutrition of toddlers, namely if the environment is not clean, there are many bacteria around the child that cause the child to be susceptible to infection (Ernawati et al., 2024; WHO, 2002). Haris et al. (2024) research shows that 30.8% of toddlers experience stunting with poor environmental sanitation of 51.1%. The results of Asparian et al. (2024) show that 32.34% of toddlers experience stunting and poor environmental sanitation of 56.4% (Samsudrajat & Jati, 2018). Data from the 2021 Indonesian Nutritional Status Study by the Ministry of Health of the Republic of Indonesia shows that the prevalence of stunting in Indonesia is 24.4%. According to the results of the Indonesian Nutritional Status Study (SSGI) in 2021, the prevalence of stunting in Central Java was 20.9%, and there was a decrease of 0.1% in 2022 with the prevalence of stunting cases being 20.8%. Stunting is a national priority program that must be implemented in all regencies and cities in Indonesia. Preventing stunting will have an impact on achieving a good generation. Stunting is one of the targets listed in goal 2 of the Sustainable Development Goals (SDG's), namely ending all forms of malnutrition, including achieving the 2025 international target for reducing stunting and wasting in toddlers and addressing the nutritional needs of adolescent girls, pregnant and lactating women, and the elderly (Umam, 2023).

The prevalence of stunting in Jepara Regency has decreased from year to year. In 2019, 19.61% of toddlers experienced stunting, in 2020, 13.78% of toddlers experienced stunting, while in 2021 it dropped to 12.91%, in 2022 it was 11.87%, then at the end of 2023 it was 6.19%. The results of a survey at the Jepara Regency Health Office found that the highest cases of stunting were in the Kedung I Health Center work area, namely in 2019 268 toddlers (16.00%), in 2020 490 toddlers (17.51%), in 2021 495 toddlers (19.69%), in 2022 642 toddlers (15.63%) and in 2023 383 toddlers (11.21%). Dongos Village is one of the villages in the working area of Kedung 1 Health Center which has a fairly high prevalence of stunting cases, namely in 2019 76 toddlers (45.2%), in 2020 57 toddlers (18.33%), in 2021 49 toddlers (18.49%) and in 2022 it increased to 77 toddlers (17.60%) and in 2023 as many as 56 toddlers (12.15%).

According to the research results, there is a relationship between the type of toilet, clean water sources, the incidence of diarrhea with cases of stunting in toddlers (Ahmadi et al., 2020; Anwar et al., 2024; Arisman, 2020; Otsuka et al., 2019). Other studies state that there is a relationship between household waste and waste management with the incidence of stunting in toddlers at the Wonomulyo Health Center, Polewali Mandar Regency in 2019. Three articles were obtained that had a significant relationship between sanitation access and the incidence of stunting in toddlers. Houses that do not have healthy toilet facilities have the potential to cause various infectious diseases that will interfere with the process of nutrient absorption so that the growth and development of toddlers is disrupted. The results of the study illustrated the lack of sanitation facilities. Research conducted by Ramdaniati et al. (2019) showed a relationship between ownership of healthy toilets and the incidence of stunting in toddlers. One article was obtained that had a significant relationship between waste management and household waste with the incidence of stunting in toddlers. This is in line with research conducted by Budihardjo et al. (2022) which stated that household waste management is related to the incidence of stunting (prevalence ratio 10.805; OR = 2.75; 95% CI = 5.654-20.648). Household waste management includes reducing, reusing and recycling. Household waste and waste management is to avoid storing waste for days in the house so that it does not endanger public health and the environment.

Method

This type of research is an observational analytical study with a quantitative approach method to determine the risk factors of household environmental sanitation on the incidence of stunting in toddlers in Dongos Village, Kedung I Health Center Working Area, Jepara Regency. The research design used was a case-control design, namely a study that compares case and control groups and then retrospectively examines risk factors that may explain cases and controls with a design as in Figure 1.

The sample in the study was toddlers who experienced stunting as the case group, and toddlers who did not experience stunting as the control group. The sample size in the case-control study was calculated using lemme show formula with the estimation of the proportion of a population using absolute precision. The number of samples in the study was 100 respondents, with a ratio of 1:1, 50 samples each between the case group and the control group. The research instrument was a questionnaire, which is a measuring instrument in the form of questions that must be filled in by respondents honestly and correctly. Data analysis used the chi-square test to then carry out logistic regression test analysis using predictive modeling.

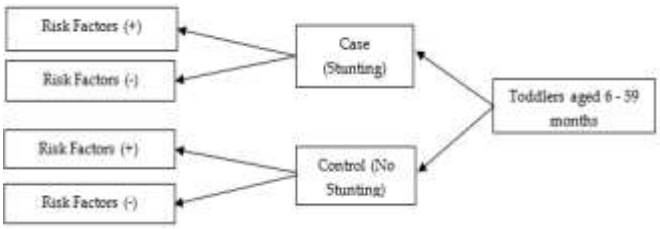

Figure 1. Research design diagram

Result and Discussion

Based on the results of research conducted on 100 respondents regarding the study of risk factors for household environmental sanitation on the incidence of stunting in Dongos Village, the working area of the Kedung I Health Center, Jepara Regency, the results of the study on the characteristics of the respondents were as follows Table 1.

Table 1. Frequency Distribution of Household Environmental Sanitation Variables and Diarrhea Incidents in Toddlers in Dongos Village, Kedung I Health Center Working Area, Jepara Regency

Variable	Frequency (n)	Percentage (%)
Household toilet ownership		
Not qualified	6	6
Qualified	94	94
Total	100	100
Household drinking water consumption patterns		
Poor	11	11
Good	89	89
Total	100	100
Household waste management		
Not safe	84	84
Safe	16	16
Total	100	100
Household wastewater management		
Not safe	89	89
Safe	11	11
Total	100	100
Toddler diarrhea incident		
No Diarrhea	70	70
Diarrhea	30	30
Total	100	100

Based on the analysis of Table 1, the majority of respondents have quality toilets, namely defecating in a toilet or WC, their own toilet, using a squatting or sitting toilet, and having a septic tank, the proportion is 94%, while 6% have not used a quality toilet. Household drinking water consumption patterns are categorized as good if the water goes through a processing process, storing drinking water in closed and tight containers, storing food equipment safely and keeping it clean, and covering food and drinks that are served properly, which meet the good criteria of 89% of 100 respondents while the remaining 11% are in the poor criteria.

Household waste management is said to be safe if there is no garbage scattered around the house, has a closed, strong and easy-to-clean trash can, then there is safe treatment (not burned, thrown into rivers/ gardens/ drainage channels/ thrown carelessly in open areas) and garbage is disposed of routinely. The proportion of houses that fall into the safe waste management category is 16% while the unsafe category is greater, namely 84%. The management of household liquid waste that falls into the safe category if the house does not have puddles of water around the house due to domestic liquid waste, there is a household liquid waste channel (non-toilet) that is watertight and closed and connected to an infiltration well or wastewater treatment installation. Houses that fall into the criteria for having safe household liquid waste treatment are 11% fewer than those that fall into the unsafe criteria, reaching 89%. The incidence of diarrhea in toddlers who have experienced diarrhea with dehydration for the past 6 months is 30%, while those who have not experienced diarrhea reach 70%.

Bivariate Analysis

The results of statistical tests on the research variables can be seen in the Table 2. Based on the results of the analysis of Table 2, it can be seen that household toilet ownership is not a risk factor for stunting in toddlers. The results of the chi-square test showed that there was no significant relationship between household toilet ownership and stunting in toddlers (p-value = 0.400; OR = 0.479; and 95% CI = 0.084-2.743). OR = 0.479 means that ownership of a poor-quality toilet has a risk factor 0.4 times greater for experiencing stunting compared to homes that have quality toilets. This is in line with research conducted by Nisa & Sukesi (2022) which states that there is no significant direct relationship between household toilet ownership and the incidence of stunting in toddlers (p-value 1.000; OR = 1.309; 95% CI = 0.310-5.533).

Based on Table 2, it shows that good household drinking water consumption patterns are more common in the control group (92%) compared to the case group (86%). The results of the chi-square test showed that there were no significant risk factors between household drinking water consumption patterns and the incidence of stunting in toddlers (p-value = 0.338; OR = 1.872; and 95% CI = 0.512-6.848). This is in line with research conducted by Dewi et al. (2021) which stated that there was no significant relationship between drinking water sources and the incidence of stunting in toddlers (p-value = 1.000; OR = 1.000; 95% CI = 0.560-17.410).

Table 2. Results of Bivariate Analysis of Household Environmental Sanitation Risk Factors on Stunting Incidents in Dongos Village, Kedung I Health Center Work Area in 2024

Variable	Casus	Control	P value	OR	95 % CI	
	n =50	n = 50			Lower	Upper
Household Toilet Ownership of Quality						
Not quality	2 (4)	4 (8)	0.400	0.479	0.084	2.743
Quality	48 (96)	46 (92)				
Drinking Water Consumption Pattern						
Poor	7 (14)	4 (8)	0.338	1.872	0.512	6.848
Good	43 (86)	46 (92)				
Household Waste Management						
Not safe	46 (92)	38 (76)	0.029	3.632	1.082	12.183
Safe	4 (8)	12 (24)				
Household Liquid Waste Management						
Not Safe	48 (96)	41 (82)	0.025	5.268	1.077	25.779
Safe	2 (4)	9 (18)				
Toddler Diarrhea Incident						
No Diarrhea	34 (68)	36 (72)	0.663	0.826	0.351	1.947
Diarrhea	16 (32)	14 (28)				

Related to the variable of unsafe household waste management, it occurred a lot in the case group, namely 46 respondents (92%), while the control group was 38 respondents (76%). The results of the Pearson chi-square test showed that there was a significant risk factor between household waste management and the incidence of stunting (p-value = 0.029; OR = 3.632; and 95% CI = 1.082-12.183). Odds Ratio = 3.632 means that households with unsafe waste management have a 3.6 times greater risk of experiencing stunting compared to homes with safe household waste management. This is in line with research conducted by Syaputri et al. (2024) which stated that household waste management is related to the incidence of stunting (prevalence ratio 10.805; OR = 2.75; 95% CI = 5.654-20.648).

Safe household wastewater management was only in the control group with a percentage of 18%. Unsafe household wastewater management occurred in all case groups, namely 96%. The results of the Pearson chi-square test showed that there was a significant risk factor between household wastewater management and stunting (p-value = 0.025; OR = 5.268; and 95% CI = 1.077-25.779). Odds Ratio = 5.268 means that households with unsafe household wastewater management have a 5.2 times greater risk of experiencing stunting compared to homes with safe household wastewater management. This is in line with research conducted by Nurjazuli et al. (2023) which states that there is a relationship between wastewater drainage and stunting (prevalence ratio 6.791; OR = 2.75; 95% CI = 3.661-12.594). The data in table 2 shows that 68% of respondents did not experience diarrhea in the case group and 72% in the control group. In the case group, 32% of toddlers experienced diarrhea. Meanwhile, 28% of toddlers in the control group. This is in line with research conducted by Suryadinata et al. (2024) which states that there is no significant relationship between diarrhea and stunting in toddlers (p-value = 0.237).

The results of the logistic regression analysis calculations show that the variables that have a significant relationship to the incidence of stunting are household waste management and household liquid waste management. From the results of calculations using SPSS analysis the predicted chance of stunting occurring among respondents is 96%.

Conclusion

Based on the research results and discussions that have been described, the following research conclusions can be put forward. The results of the bivariate analysis show that the variables that are risk factors for stunting in toddlers are household waste management (p-value = 0.029) and household wastewater management (p-value = 0.025). The results of the bivariate analysis show that the variables that are not risk factors for stunting are household toilet ownership (p-value = 0.400), household drinking water consumption patterns (p-value = 0.338)

and diarrhea (p-value = 0.663). The results of the logistic regression analysis calculation show that the variables that have significant risk factors for stunting are household waste management, household fly density and household wastewater management. The chance of stunting occurring with these risk factors is 96%.

Acknowledgments
The authors would like to express their sincere gratitude to the research team, whose valuable contributions and dedication were instrumental to the success of this study.

Author Contributions
S.S., M.: Conceptualization and methodology. M.A.; validation and revision. Z.A.: formal analysis, and resources. M. A.A.: writing—original draft preparation, visualization and revision. All authors have read and agreed to the published version of the manuscript.

Funding
This research on "The Relationship between Cognitive Abilities and Laboratory Skills Among Chemistry Students" was conducted with self-funded support, without any external financial assistance or sponsorship.

Conflicts of Interest
The researchers affirm that there are no conflicts of interest associated with this study. It was carried out independently, without any external financial, professional, or personal influences that could have impacted the results or the integrity of the research. The findings and conclusions are entirely based on the authors' own analysis and work.

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