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The relationship between households with proper sanitation and stunting prevalence: A case study

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Abstract

Background: Stunting reflects a failure in the optimal growth and development of children and is influenced by a range of factors. The World Health Organization (WHO) sets the global stunting prevalence target at below 20%. In response, the Indonesian government has set a national target of reducing stunting to 14% by the year 2024. While direct causes of stunting include inadequate breastfeeding and poor nutritional intake, indirect factors such as access to safe and proper sanitation at home also play a significant role in stunting prevalence.
Purpose: To analyze the relationship between access to proper sanitation facilities in households and the prevalence of stunting.
Method: This research utilizes secondary data from the Indonesian Central Bureau of Statistics (BPS) on household sanitation coverage in 2022, along with data on stunting prevalence from the 2022 Indonesian Nutrition Status Survey. The data were analyzed using a bivariate correlation test via SPSS software to determine the strength and direction of the relationship between the two variables.
Results: The analysis produced a p-value of 0.00, which is below the significance level (α = 0.05), indicating a statistically significant correlation. The Pearson correlation coefficient was found to be -0.589, suggesting a moderate negative relationship between proper household sanitation and stunting prevalence. This means that as the number of households with proper sanitation increases, the rate of stunting decreases and conversely, lower sanitation access is associated with higher stunting levels.
Conclusion: The study concludes that proper sanitation in households has a moderate inverse relationship with the prevalence of stunting in Indonesia.

Keywords: Home; Proper; Relationship; Sanitation; Stunting.

INTRODUCTION

Stunting is a condition of impaired growth in children, commonly caused by prolonged nutritional deficiencies that hinder their physical and developmental progress (Mustakim, Irawan, Irmawati, & Setyoboedi, 2022). Stunting is a public health issue that generally occurs in developing countries and is caused by various factors, including Water, Sanitation, and Hygiene (WASH) (Silva, Vieira, Abreu, de Souza Fernandes, Moreira, da Costa, & Cotta, 2023). Children experiencing stunting can typically be identified through physical indicators such as below-average weight and height for their age. In addition to physical signs, stunted children may also show delays in developmental domains such as cognitive, motor, language, social, and emotional skills. If left unaddressed without appropriate health interventions, stunting can lead to more serious long-term health issues, including a weakened immune system, increased vulnerability to illnesses, and a higher risk of chronic diseases such as heart conditions,

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diabetes, hypertension, and metabolic disorders (Badriyah, & Syafiq, 2017). Inadequate nutritional intake in children can result from various factors, one of which is poor environmental sanitation. Unsanitary conditions increase the risk of exposure to infectious agents such as bacteria and viruses. Dirty environments serve as breeding grounds for these pathogens, which can spread to humans through inhalation, ingestion, or skin contact. These transmission routes can lead to infections that impair nutrient absorption in children. One common illness linked to poor sanitation is diarrhea, which, along with other digestive disorders, can significantly disrupt the body's ability to absorb essential nutrients (Handayani, 2023).

Although environmental sanitation is not a direct cause of stunting, if left unmanaged, it can significantly increase the risk. The decline in sanitation quality is caused by several factors, including climate change, which increases the risk of flooding and water pollution as a result of floods (Mremi, Kimwaga, Mulungu, & Izdori, 2025). Maintaining good sanitation is especially crucial in households with pregnant women or young children, as these groups are particularly vulnerable to infection. Pregnant women are considered high-risk because the first 1,000 days of life from conception to a child's second birthday are critical for growth and development. Therefore, ensuring that pregnant women not only maintain their personal health but also live in a clean and healthy environment is essential to reducing the risk of stunting in their children (Mustafidah & Giarto, 2021). If a child is identified as stunted, immediate action should be taken by seeking medical assistance to receive appropriate health interventions, including the provision of supplementary food. Nutritional improvement through such interventions is intended to help meet the nutritional needs of the child, which were previously lacking, in order to support proper growth and development. However, prevention remains a more effective and lower-risk approach than treatment. Therefore, both the government and the community must take serious steps to prevent stunting as early as possible.

According to the Indonesian Ministry of Health Regulation No. 3 of 2014 concerning Community-Based Total Sanitation, there are five essential pillars to break the chain of disease transmission and poisoning. These five pillars include: (1) stopping open defecation, (2) handwashing with soap, (3) safe management of household drinking water and food, (4) proper household waste disposal, and (5) safe management of household liquid waste. These five pillars serve as critical points of focus for both the government and the public to help reduce the prevalence of stunting. Implementing these pillars requires collective efforts, ranging from increasing public awareness through health promotion to the development of regulations and policies that support the realization of the Community-Based Total Sanitation framework. The World Health Organization (WHO) has set a global target for stunting prevalence at a maximum of 20%. In comparison, the Indonesian Government, through Presidential Regulation No. 18 of 2020 on the National Medium-Term Development Plan for 2020–2024, aims to lower stunting prevalence to 14% (Torlesse, Cronin, Sebayang, & Nandy, 2016).

Stunting prevention begins at the most basic level of society the household. This is because addressing stunting has a much greater impact when accompanied by changes in community behavior (Humphrey, Mbuya, Ntozini, Moulton, Stoltzfus, Tavengwa, & Kaswa, 2019). By increasing family members' awareness of stunting, the risk of the condition can be reduced. One preventive measure is to ensure adequate household sanitation, which protects family members from exposure to bacteria and viruses that can cause disease. The government can support this through policy initiatives and cross-sector collaboration, including partnerships with civil society organizations to ensure proper sanitation access at the household level. This study aims to explore the relationship between household sanitation and stunting prevalence in 2022. Sanitation is often overlooked because its impact on health is not immediately apparent, but poor sanitation tends to produce long-term negative effects. This research aligns with the Sustainable Development Goals (SDGs), specifically Goal 3 (Good Health and Well-being) and Goal 6 (Clean Water and Sanitation). Therefore, the findings of this study are expected to inform policy recommendations for the government and provide scientific insights that the public can use as a reference in efforts to address stunting.

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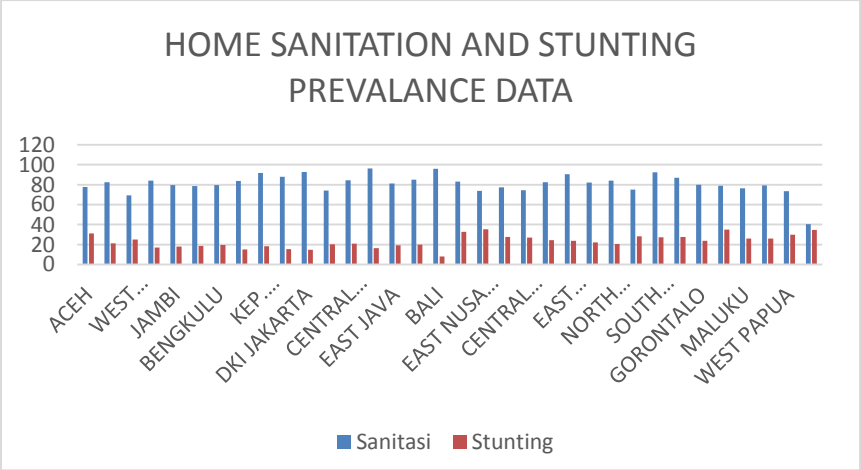
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RESEARCH METHOD

This study employed a quantitative approach using secondary data as its primary source. The data on households with access to proper sanitation in 2022 were obtained from the Indonesian Central Bureau of Statistics (BPS), while the data on stunting prevalence in the same year were sourced from the 2022 Indonesian Nutritional Status Survey. The collected data were analyzed using a bivariate correlation test with IBM SPSS version 25. Bivariate correlation analysis is a statistical method used to examine the relationship between two variables.

RESEARCH RESULTS

Figure 1. Data on Proper Household Sanitation and Stunting Prevalence in Indonesia in 2022



According to the data above, the average percentage of households with access to proper sanitation across Indonesia is 80.9%. The province with the highest percentage is the Special Region of Yogyakarta at 96.21%, while the lowest percentage is Papua Province, with only 40.34% of households having proper sanitation. In terms of stunting prevalence in 2022, East Nusa Tenggara Province recorded the highest figure, at 35.3%, while Bali Province had the lowest, at 8%.

Table 1. Statistical Test

Correlations		Stunting Prevalence	Home Sanitation
Stunting Prevalence	Pearson Correlation	1	-.589**
	Sig. (2-tailed)		.000
	N	34	34
Home Sanitation	Pearson Correlation	-.589**	1
	Sig. (2-tailed)	.000	
	N	34	34

**Correlation is significant at the 0.01 level (2-tailed)

Table 1 shows the results of the bivariate correlation test, which produced a p-value of 0.00, indicating statistical significance since it is below the alpha level of 0.05. The Pearson correlation coefficient was -0.589, with a confidence interval of 95%. These findings suggest a moderate negative relationship between proper household sanitation and stunting prevalence.

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Table 2. Pentahelix Roles and Strategies in Sanitation and Stunting Prevention

Pilar Pentahelix	Main Role	Proposed Collaborative Strategy
Government	Regulator, budget and infrastructure provider	Formulation of integrated sanitation policies. Budget allocation for healthy latrine construction. Cross-sector STBM (Community-Based Total Sanitation) programs. Development of health facilities
Academia	Researcher, innovation developer, and evaluator	Sanitation and stunting research based on local data. Development of evidence-based educational modules.
Business Sector	Financial and technological supporter	CSR for sanitation development. Innovations in toilet technology, waste management, and affordable wastewater systems (SPAL).
Community	Behavior change implementer	Empowerment of local cadres and community leaders. PHBS (Clean and Healthy Living Behavior) campaigns based on local wisdom.
Media	Information disseminator and public opinion influencer	Social media campaigns on sanitation Publication of success stories from stunting-free villages.

The pentahelix collaboration in stunting prevention and sanitation improvement involves five key pillars. The government acts as a regulator and provider of budgets and infrastructure through integrated policies, health facility development, and cross-sector STBM programs. Academia contributes through local data-based research and the development of evidence-based educational modules. The business sector supports with CSR funding and innovations in sanitation technology, waste management, and affordable wastewater systems. Communities serve as agents of behavior change by empowering local cadres and promoting PHBS campaigns rooted in local wisdom. Meanwhile, the media disseminates information and shapes public opinion through digital campaigns and the publication of success stories from stunting-free villages.

DISCUSSION

The findings of this study reveal a moderate negative correlation between access to proper sanitation at the household level and the prevalence of stunting in Indonesia in 2022. This indicates that as the proportion of households with adequate sanitation increases, the incidence of stunting tends to decrease. These results support existing research highlighting the significant role that environmental sanitation plays in child growth and nutritional outcomes (Prendergast & Humphrey, 2024). Poor sanitation conditions often lead to increased exposure to pathogens that cause infections such as diarrhea and environmental enteric dysfunction (EED), which interfere with nutrient absorption and directly contribute to child malnutrition and growth failure (Ngure, Reid, Humphrey, Mbuya, Pelto, & Stoltzfus, 2024). Improved water, sanitation, and hygiene (WASH) practices are essential components in stunting prevention strategies, especially in low- and middle-income countries (World Health Organization, 2022). Poor sanitation can lead to various diseases that indirectly contribute to stunting (Kurniawati, Arini, Awwalina, & Pramesti, 2021). One such disease is diarrhea, which interferes with nutrient absorption. If left untreated over time, this can result in malnutrition,

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negatively affecting a child's growth and development.

The distribution of adequate household sanitation across Indonesian provinces remains uneven, highlighting the need for improvements especially at the household level. This disparity suggests inequality in sanitation infrastructure. The particularly low percentage of households with proper sanitation in Papua, at only 40.34%, is more than twice as low as that in the Special Region of Yogyakarta, which stands at 96.21%. This gap should be a serious concern for policymakers. In addition to infrastructure inequality, another crucial factor is public awareness about practicing clean and healthy living behaviors. To improve household sanitation, one of the key infrastructure components that must be addressed is access to hygienic toilets. A proper household toilet should meet several criteria: it must have walls and a roof, a clean water source, be located more than 10 meters from a water source, use a goose-neck (S-trap) design, have a non-slip, waterproof floor, a proper waste disposal system, a septic tank, and a reliable supply of clean water (Darmawan, Maria, Aurora, Kusdiyah, & Nuriyah, 2023).

In addition to access to proper toilet facilities, the implementation of the five pillars of Community-Based Total Sanitation (STBM) also requires the availability of handwashing stations with flowing clean water, soap, and designated washing areas. It is equally important to improve household waste and wastewater management facilities. Poorly managed household waste increases the risk of the spread of disease-causing agents. Effective waste management includes providing separate waste bins for different types of waste and establishing waste collection points (TPS) within residential communities (Chandra, Ardi, & Putra, 2020). Another crucial infrastructure improvement involves the management of household liquid waste. This includes both grey water (from washing clothes, bathing, and cooking) and black water (from toilets), which should be managed through a closed and dedicated Wastewater Management System (SPAL). Such systems help prevent domestic wastewater from contaminating rivers and nearby clean water sources.

Ensuring adequate household sanitation cannot rely solely on infrastructure development it must be supported by increasing public awareness and behavior change toward clean and healthy living. This includes ending open defecation, developing the habit of handwashing with soap, and maintaining hygiene in managing drinking water and household food. Promoting these behaviors requires strategic health promotion efforts, such as collaboration with village officials and community organizations, as well as utilizing social media as a tool for health communication. Proper household sanitation can contribute to reducing stunting prevalence, as clean and healthy environments lower the risk of infection from disease-causing pathogens that, over time, can contribute to stunted growth. Addressing stunting effectively must begin with identifying its root causes. This study shows that proper sanitation is associated with stunting incidence, highlighting the need to increase the percentage of households with access to proper sanitation—both through infrastructure development policies and public health promotion initiatives aimed at raising community awareness.

In Indonesia, disparities in access to sanitation are still evident across provinces. For instance, provinces like Papua continue to show low percentages of proper household sanitation, which may contribute to their high stunting prevalence (Central Bureau of Statistics, 2022). This suggests that infrastructure inequality remains a critical barrier to achieving national health targets, including the government's goal of reducing stunting prevalence to 14% by 2024. There are several efforts that can be undertaken to improve household access to proper sanitation in order to reduce the prevalence of stunting. One such effort is the use of the pentahelix approach, which involves cross-sector collaboration. The pentahelix approach is a strategy that engages five key stakeholders: Government, Academia, Business Sector, Media, and the Community (Fauziah, Andayani, Ariadi, Koesbardiati, & Praharsena, 2022). However, to enhance the success of solutions based on pentahelix collaboration, certain supporting factors must be taken into account. The key supporting factors for the success of pentahelix collaboration include the presence of legal frameworks and policies issued by the government, community support, and information dissemination by the media (Spears, 2023).

Additionally, the role of household behavior and awareness is equally important. Even with available sanitation infrastructure, a lack of hygienic practices, such as regular handwashing or safe food and water handling, can continue to expose children to disease-

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causing agents (Tiyas & HasanBasri, 2023). Therefore, combining infrastructure development with health promotion efforts is necessary to achieve meaningful and sustained reductions in stunting. This study aligns with the Sustainable Development Goals (SDGs), particularly Goal 3 (Good Health and Well-being) and Goal 6 (Clean Water and Sanitation). It underscores the need for integrated interventions that address both environmental and behavioral factors related to sanitation and child health. Further research involving longitudinal data and broader socioeconomic variables could enrich understanding of this relationship and inform more targeted policy measures. A cross-sectoral approach is crucial because reducing the prevalence of diarrhea requires programs not only within the health sector but also beyond it, including poverty reduction, community education, and the provision of clean water and sanitation (Otoo, Gaffey, Confreda, Somaskandan, Islam, Kyei-Arthur, & Adu-Afarwuah, 2025). Stunting cannot be addressed instantly, even when efforts are made through education and poverty alleviation programs (Rahardiantoro, Juhanda, Kurnia, Aswi, Sartono, Handayani, & Cramb, 2024). Diarrhea must be treated promptly and as early as possible to minimize its impact on child growth and development. This is important because stunting in children can lead to impaired cognitive development (Cameron, Chase, Haque, Joseph, Pinto, & Wang, 2021). Addressing stunting must also be accompanied by the provision of adequate healthcare facilities, as the availability of proper health services is closely related to stunting treatment, especially when it is caused by climate change factors (Yeboah, Lohmann, Koulidiati, Kuunibe, Kyei, Hamadou, & De Allegri, 2024).

CONCLUSION

A moderate relationship between proper household sanitation and the prevalence of stunting, with a Pearson correlation coefficient of -0.589 and a p-value of 0.00, indicating a statistically significant association at the 5% level of significance. This suggests that better household sanitation is associated with lower rates of stunting among children. Nationally, in 2022, the average percentage of households in Indonesia with access to proper sanitation was 80.9%. The Special Region of Yogyakarta recorded the highest rate at 96.21%, while Papua Province had the lowest, with only 40.34% of households having adequate sanitation facilities.

In terms of stunting prevalence, East Nusa Tenggara reported the highest rate at 35.3%, whereas Bali Province had the lowest rate, at just 8%. These figures indicate a potential correlation between the quality of household sanitation and the occurrence of stunting. Proper sanitation plays a crucial role in reducing stunting because a clean and healthy living environment minimizes the presence and spread of pathogens that cause disease. In contrast, inadequate household sanitation such as the absence of proper toilets, handwashing facilities with soap, safe management of drinking water and food, wastewater disposal systems, and garbage collection-creates conditions where pathogens like those causing diarrhea can thrive. Such infections interfere with nutrient absorption, and over time, can lead to chronic malnutrition and stunted growth in children.

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