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# The Influence of Nutrition, Clean Water, and Hand Hygiene on Stunting Incidences

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**ABSTRACT**

Among the nutritional problems affecting toddlers that have not yet been fully resolved, they can result in failure to grow and develop, which can lead to stunting. The prevalence of stunting tends to decrease every year, but the decline is still not substantial. This research aims to identify the influence of nutrition, clean water, and hand hygiene on the incidence of stunting. The research used was an analytical correlation. The research design was cross-sectional. There were 130 participants in this research sample. The Chi-square bivariate analysis data and multivariate analysis using ordinal logistic regression. The results of the bivariate analysis showed that the most frequent cases of stunting were very short, with 81 cases (62%). Statistically, there is a significant relationship between nutrition (p = 0.000), clean water (p = 0.000), and hand hygiene (p = 0.004) with the incidence of stunting. Multivariate analysis shows that clean water has a most dominant effect on nutritional status with a Wald value of 17.290. Insufficient nutritional intake, unavailability of clean water, improper hand hygiene can cause stunting. Improvement in these three factors is very important to reduce the prevalence of Stunting and improve the nutritional status of children in the study area. The government and health organizations must increase public awareness with nutritional programs, clean water sanitation and getting used to hand hygiene.

**Keywords:** Clean water, Hand hygiene, Nutrition, Stunting

## INTRODUCTION

Stunting is a condition of chronic malnutrition so that a child's height is shorter than the normal range for their age which can result in growth and development failure in toddlers (Putri, 2023). The incidence of stunting in Indonesia is still a very serious problem because it is associated with the risk of illness, one of the characteristics of Stunting is that a child's height is less than the average height for his age (Purwanti 2021). Stunting has an impact on the developmental process starting from conception until the 4th year of life, during which year it determines the growth and development of toddlers, such as the development of their intelligence level (Rusdi 2021).

The World Health Organization (WHO) states that the incidence of stunting is still quite high. The prevalence of stunting in 2023 is 22.3%. Meanwhile, in Asia, there is a 52% incidence of stunting and 43% in Africa (WHO 2023). The prevalence of stunting tends to decrease every year, but the decline is still not substantial (Aulina 2022). According to SSGI data in Indonesia, the incidence of stunting in 2021 is 24.4% and will be 21.6% in 2022 (Kemenkes 2022). The number of stunting in 2021 in East Java is 23.5%, and in 2022, the number of stunting will decrease to 19.2%. Meanwhile, Jember is the highest district, with a stunting rate of 34.9% in 2022 (Ignatia 2023).

Malnutrition can result in delayed brain development, decreased body resistance, and easy infection (Prakhasita 2022). Several problems impact health caused by stunting, including impaired physical growth and impaired mental and cognitive growth, and can result in death (Rahayuwati et al. 2022). The incidence of stunting can be influenced by several factors, namely the mother's education and knowledge regarding the nutrition consumed during pregnancy and that given to toddlers (Agustina 2022). Inadequate environmental conditions, including water and sanitation, are also factors in the incidence of stunting (Mediani 2020). Children's growth and development will be affected by malnutrition at the ages of 24 and 59 months (Hasyim, 2024).

The diet provided by the mother is very influential in the growth and development process of toddlers, and food nutrition is related to the child's growth and intelligence (Prakhasita 2022). Children need to get the right amount and quality nutrition. Nutritional needs that must be met include protein, carbohydrates, fat, vitamins, water, and minerals (Putri 2023). Poor water, sanitation, and hygiene can cause infectious diseases, causing stunting (Aulina 2022). Water sanitation and cleanliness also play a role in the success of growth and development, which is closely related to the occurrence of stunting, namely the use of

water sources, clean sanitation, and hand washing habits (Mediani 2020).

The problem of stunting that occurs in childhood can have an impact on pain, physical growth disorders. The direct causes of stunting include inadequate nutritional intake, indirectly stunting can be caused by parenting patterns, inadequate environmental health including water and sanitation. Poor environmental sanitation factors include inadequate access to clean water, use of unhealthy toilet facilities and poor hand washing behaviour contribute to the causes of stunting. The high rate of stunting in toddlers, researchers are interested in conducting research with the title "The Influence of Nutrition, Clean Water, and Hand Hygiene on Stunting Incidences".

## RESEARCH METHODS

The research uses an analytical correlation approach with a quantitative approach. The independent variables of this research are nutrition, clean water, and hand hygiene, which are the dependent variables for the incidence of stunting. In this study, the dependent variable uses anthropometric measurement instruments. For the independent variables, the researcher used 2 questionnaires, the clean water and hand hygiene variables used the EHRA (Environmental Health Risk Assessment) questionnaire from the Ministry of Health standards that have passed validation and reliability checks. While the nutrition variable uses the CFQ (Child Feeding Questionnaire) questionnaire sourced from (Prakhasita, 2022). Has been tested for validity and reliability with the results, the validity test of the questionnaire is valid with a value of > 0.444. Reliability is a measure of Cronbach's Alpha value of 0.6 or greater.

This research was conducted in June 2024. This study used the consecutive sampling method. This technique was carried out until the required number of samples was met based on the inclusion criteria of mothers who had children under 5 years of age with stunting and at risk of stunting. mothers of toddlers who were willing to be respondents and signed the consent form after receiving an explanation of the research procedure, a total of 130 sample. Univariate analysis uses descriptive statistics. The bivariate analysis uses the Chi-square test. Multivariate analysis uses an ordinal logistic regression test, to determine the most dominant influencing factors of the variable's nutrition, clean water and hand hygiene.

## RESULTS AND DISCUSSION

**Table 1**
Effect of Nutrition on the Incidence of Stunting

| No | Nutrition | Stunting | | | Amount | P value |
|---|---|---|---|---|---|---|
| | | Very short | Short | Normal | | |
| 1 | Good | 12 | 0 | 23 | 35 | |
| 2 | Enough | 24 | 0 | 21 | 45 | 0.000 |
| 3 | Not enough | 45 | 3 | 2 | 50 | |
| | Amount | 81 | 3 | 46 | 130 | |
| | Clean water | | | | | |
| 1 | Worthy | 16 | 0 | 34 | 50 | |
| 2 | Not feasible | 65 | 3 | 12 | 80 | 0.000 |
| | Amount | 81 | 3 | 46 | 130 | |
| | Hand Hygiene | | | | | |
| 1 | Good | 44 | 1 | 11 | 56 | 0.004 |
| 2 | Bad | 37 | 2 | 35 | 74 | |
| | Amount | 81 | 3 | 46 | 130 | |

The data distribution shows that nutrition influences the incidence of stunting, namely poor nutrition, with 45 respondents in the short category, three respondents in the short category, and 2 in the normal category. These results indicate that there is a significant relationship between nutrition and Stunting with a significant p value of 0.000. Clean water influences the incidence of stunting, whereas unsuitable water does, with 65 respondents in the very short category, three respondents in the short category, and 12 respondents in the normal category. These results indicate that there is a significant relationship between Clean Water and Stunting with a significant p value of 0.000. Hand hygiene influences the incidence of stunting, namely poor hand hygiene, with 37 respondents in the very short category. These results indicate that there is a significant influence between Hand Hygiene and the incidence of Stunting at a significance of p value 0.004.

The results of the logistic regression analysis showed that the nutrition variable had a sig value of 0.000 with a wald value of 15.837, clean water had a sig value of 0.000 with a wald value of 17.290, hand washing had a sig value of 0.068 with a wald value of 3.331. The results showed that nutrition had an influence on nutritional status, clean water had the most dominant influence on nutritional status, hand hygiene also has an effect on the incidence of stunting.

**Table 2**
Multivariate Ordinal Logistic Regression Analysis of Nutrition, Clean Water, and Hand Hygiene on the Incident of Stunting.

| | | Estimate | Std. error | Wald | df | Sig. | 95% Confidence Interval | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | Lower Bound | Upper Bound |
| Threshold | Stunting =0.00 | .804 | .538 | 2.235 | 1 | .135 | -250 | 1.857 |
| | Stunting =1.00 | .976 | .541 | 3.258 | 1 | .071 | -.084 | 2.035 |
| Location | Nutrition =0.00 | -2.562 | .644 | 15.837 | 1 | .000 | -3.824 | -1.300 |
| | Clean water =0.00 | 1928 | .464 | 17.290 | 1 | .000 | -1.019 | 2.837 |
| | Hand hygiene=0.00 | .871 | .477 | 3.331 | 1 | .068 | -.064 | 1.807 |

Adequate nutrition is very important during a child's growth and development. Good nutrition is one of the foundations of optimal health and human development (WHO 2023). It is important to focus on the nutritional quality of children under five, as this can have a significant and long-term impact on their overall health (Nuzula 2019). To ensure that children consume healthy food, parents must, of course, understand the need for good and adequate nutrition (Cholana and Miranda 2023). Researchers assume that adequate nutrition for children under five years of age greatly determines the child's future growth and development. Pay attention to parents. Lack of food intake, as well as complementary foods that have low energy content, can be a factor in children's lack of nutrition, which can cause various diseases or disorders caused by malnutrition, such as a child having no appetite. The incidence of stunting in toddlers still shows a fairly high number, this is influenced by poor feeding patterns. Good nutrition for children has a great impact on the growth and development of children and their intelligence. The incidence of stunting in toddlers can be overcome, one of which is by implementing a good and correct nutritional pattern by providing food that meets the child's daily nutritional needs, such as sources of carbohydrates, protein, fat, vegetables, and fruits.

Clean water has a very important role in maintaining health and preventing various diseases (Hargono et al. 2022). Clean water must be clear, colorless, odorless, and tasteless. Turbidity and color of water can indicate the presence of contamination or undesirable substances (WHO 2023). Poor water quality can also interfere with the absorption of nutrients that are important for growth, hinder children's physical and mental development, and reduce their body's resistance to other diseases (Syam and Sunuh 2020). The availability of clean water has a significant impact on the health, quality of life, and welfare of the community. Sufficient clean water is very important to prevent various diseases caused by water, which can inhibit children's growth, such as diarrhea and digestive tract infections. Healthy children tend to have better physical development. Providing clean water and good sanitation can reduce the burden of disease in society and improve overall health. Several pieces of evidence from various studies have similarities with findings from abroad which reveal that unimproved water increases the incidence of stunting in toddlers. Findings in Ethiopia reveal that drinking water sources are associated with the incidence of stunting in toddlers (Kwami et al., 2019).

Hand hygiene is a simple but very important measure in preventing disease (Hellewell et al. 2020). Lack of hand hygiene is a major risk factor for gastrointestinal and respiratory tract infections that can cause significant morbidity and mortality, especially among children (Ango, Teshome, and Getahun 2023). Hand hygiene is a health practice; washing hands with soap can remove pathogens before they enter the body. This action is simple but very effective in preventing disease and maintaining health. Children often play and interact with their environment, making them vulnerable to exposure to microorganisms that can cause various diseases. Diseases that attack children can affect or even hinder the growth and development process through the mouth, nose, or eyes.

Hand washing is often considered trivial in society (Sunardi & Ruhyanuddin, 2019). Hand hygiene is an action to maintain hand cleanliness and a person's health for well-being. Poor hand hygiene practices will increase the high risk of bacteria (Aisah et al., 2019). Good hand hygiene is one of the most effective steps to prevent the spread of infectious diseases (Aulina, 2022). When holding something, and shaking hands, of course there are germs that stick to the skin of our hands. These microorganisms will cause diseases such as diarrhea which will result in stunting in children.

Test analysis results: Chi-square test results showed that there was a significant influence between the Nutrition variable and the incidence of Stunting with a significant value of p=0.000, which indicated that there was a significant relationship between Nutrition and the incidence of Stunting. This result is in accordance with research conducted by (Hanani 2020), which states that with a significance value of p = 0.033. Feeding patterns and the incidence of stunting are significantly correlated. This relationship explains that mothers whose children experience stunting have inappropriate feeding practices. Meanwhile, in research (Amalia et al. 2023). the results of bivariate tests comparing feeding practices and the incidence of stunting were not statistically significant (p = 0.674, p <0.05). This is due to the mother's excellent nutritional knowledge and the application of high-quality and high-quantity food. Stunting among children under

five continues to occur at quite high levels. Factors contributing to this include irregular feeding patterns. Providing children with foods that meet their daily nutritional needs, such as fruit, vegetables, whole grains, protein, and fat, will help ensure their diet is healthy.

The results of the Chi-square test analysis showed that there was a significant influence between clean water and the incidence of stunting. with a significance value of p=0.000 (p<0.05). Unsuitable clean water has a chance of stunting children. Some data from several studies are consistent with international research, which shows that poor water quality increases the risk of stunting in children under five. Research results from Ethiopia show a correlation between the prevalence of stunting in children under five and their drinking water sources (Kwami et al. 2019). In contrast, research (Yuniartika 2021) explains that toddlers who do not experience stunting are the majority of those who consume drinking water by processing it. As a result, a p-value of 0.454 (>0.05) was obtained from analysis using the Chi-square statistical test. Thus, the frequency of stunting and drinking water treatment does not have a significant relationship. Children can experience nutritional problems if they have access to drinking water from unsuitable sources, such as water sources that are too close to toilets or that need to be properly treated before consumption.

The results of the Chi-Square test analysis showed that there was a significant influence between hand hygiene and the incidence of stunting with a significance value of p=0.004 (p<0.05). Poor hand hygiene can cause children to become stunted. Based on the results of research conducted by (Desyanti and Nindya 2019) it shows that there is a significant relationship between hand hygiene practices and cases of stunting. Poor hygiene practices pose a high risk of bacterial growth. In contrast to research (Permatasari, Soerachmad, and Hasbi 2021), the Chi-square test produces a p-value of 0.730 > 0.005. Thus, there is no relationship between the prevalence of stunting and the practice of washing hands with soap. Because the majority of respondents wash their hands without using soap, and only a few use soap, the steps still need to be appropriate.

The results of the ordinal logistic regression analysis show that clean water has a statistically significant effect on the log odds of nutritional status with a value of Sig. 0.000 and a Wald result of 17,280 shows that the use of inadequate water can affect the nutritional status of children. The results of this research are in line with research (Novianti, Huriyati, and Padmawati 2023) that there is a relationship between Clean Water and the incidence of Stunting p-value: 0.001. In contrast to research on clean water on Stunting conducted by (Yuniartika 2021) the Chi-square test obtained a p-value of 0.454. So, there is no significant relationship between drinking water treatment and the incidence of stunting. Environmental sanitation, especially clean water, which is used for daily needs, especially needs to be addressed regarding the suitability of the water source and how it is processed. Unsuitable water does not immediately cause problems. However, over time, contaminated water carries various disease-causing pathogens. When these pathogens attack children whose body strength is still lacking, it will cause problems that can affect the growth and development process, which is characterized by the child's lack of height when compared to children his age, which is called Stunting. The limitations in this study are during the research, there was limited time for parents during the interview. So that researchers tried to dig up complete information as much as possible with limited time. The condition of children with stunting can also create privacy for some parents who are not willing to be research respondents.

## CONCLUSION

The results of this study show the influence of nutrition on the risk of stunting. The results of the test show that there is a significant relationship between parenting style and stunting (p-value = 0.000). The results of the test for Clean Water and the risk of Stunting incidents show a significant influence between Clean Water and the risk of Stunting incidents (p-value = 0.000). For the variable between Hand Hygiene, the test results show a significant effect with a p-value of (0.004). Ordinal logistic regression analysis shows that the Clean Water variable has the most influence on the incidence of Stunting compared to the Nutrition and Hand Hygiene variables with Sig. 0.000 and a Wald result of 17,290. Nutrition has a significant influence on the incidence of stunting (p = 0.000 and a Wald result of 15.837). The quality of children's nutrition has a significant long-term impact on their growth, development and overall health. Meanwhile, based on the results of the logistic analysis test, hand hygiene has an has an influence on nutritional status, but is not a dominant factor.

## SUGGESTION

Further research is expected to conduct an in-depth analysis of the adequacy of the water content consumed, and further researchers can explore the relationship between access to improved sanitation and stunting through longitudinal studies. Collecting qualitative data through in-depth interviews or focus group discussions can help understand the context and factors that influence Nutrition, Clean Water, and Hand Hygiene. Governments and health organizations should raise public awareness of good sanitation, such as managing clean water and implementing good sanitation, to minimize the risk of diseases that can affect child growth.

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