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Drinking Water Factors and Stunting Among Children Under Five in Konawe Islands Regency

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ABSTRACT

Introduction: Stunting remains a major nutritional problem affecting children's growth and development and contributes to the quality of human resources. The prevalence of stunting in several community health centers in Konawe Islands Regency remains high. This study aimed to analyze the relationship between drinking water factors (source, treatment, and physical quality) and the incidence of stunting among children under five years old.

Method: This study used a quantitative approach with a cross-sectional design. The population consisted of 1,125 toddlers, and 89 respondents were selected using simple random sampling. Data were analyzed using the Chi-Square test, correlation test, and binary logistic regression.

Result: The Chi-Square test results showed a significant relationship between drinking water sources and stunting (p=0.000), drinking water treatment and stunting (p=0.000), and drinking water quality and stunting (p=0.000) with correlation coefficient φ = 0.396.

Conclusion: Drinking water factors, including water source, treatment, and physical quality, are significantly associated with the incidence of stunting among children under five in Konawe Islands Regency.

Introduction

Indonesia's public health status is assessed by the extent to which it has reduced the infant mortality rate. The third primary objective of the Sustainable Development Goals (SDGs) is to ensure the well-being and improve the quality of life for everyone across all ages.[1] The 2030 SDGs target is to achieve 25 deaths of children under five per 1,000 live births. To achieve this, the government has developed a strategic plan aimed at improving the toddler weight indicator.[2] The condition known as stunting is a public health problem because it is often associated with an increased risk of disease and death, as well as factors that inhibit physical and mental development.[3]

Stunting is a major nutritional problem in Indonesia, which can determine the quality of

human resources.[4] Stunting is a condition of stunted growth in toddlers due to chronic malnutrition, resulting in them being too short for their age. Stunted children are vulnerable to disease, face difficulties in physical and cognitive development, are at risk of developing degenerative diseases in adulthood, and pose a threat to their lives and the loss of a generation.[5]

The prevalence of stunting in the world in 2020 was 22% of toddlers, then in 2021 it was 22.1% and in 2022 it was 22.3%.[6] Meanwhile, in Indonesia, based on the results of the 2019 Indonesian Toddler Nutrition Status Study, the prevalence of stunting was 27.7%, then based on the results of the 2021 Indonesian Nutrition Status Survey it was 24.4% and in 2022 it was 21.6%.[7]Meanwhile, the prevalence of stunting in Southeast Sulawesi Province was 31% in 2019, 30.2% in 2021, and 27.7% in 2022. The prevalence of stunting in the Konawe Islands Regency Health Office was 32.9% in 2020, 32.8% in 2021, and 32.3% in 2022.[8]Based on these data, it can be seen that the prevalence of stunting has not reached the national stunting target of 14%.[9]

This research area focused on the Langara, Bobolio, and Lampeapi Community Health Centers, this is because the prevalence of stunting in the work area of the Community Health Center ranks third highest in the Konawe Islands Regency and the prevalence of stunting in the area has not reached the National stunting prevalence target, in addition, the area is also a coastal area so it has more complex environmental problems than other Community Health Centers. The prevalence of stunting at the Langara Community Health Center in 2020 was 35.4%, in 2021 it was 35.1 and in 2022 it was 34.8%. Similarly, at the Bobolio Community Health Center, the prevalence of stunting in 2020 was 33.9%, in 2021 it was 32.8% and in 2022 it was 31.9%. The prevalence of stunting at the Lampeapi Community Health Center in 2020 was 33.3%, in 2021 it was 32.9% and in 2022 it was 32.6%.

The working areas of Langara, Bobolio, and Lampeapi Community Health Centers are located in coastal regions. These environments have high humidity levels that support the growth of bacteria and viruses, which may increase the risk of infectious diseases among children under 5 years old, so they are easily affected by nutritional disorders and if not addressed quickly will have an impact on declining nutritional status and ultimately experience malnutrition. Coastal areas provide an abundance of protein from marine biota, especially fish in fishing communities and their existence contributes to the nutritional status of children, but people who live in coastal areas, especially fishermen, tend to sell the fish they get and not consume by the household, so they are at risk of malnutrition, one of which is stunting.

According to information from the Nutrition Program Manager at the Konawe Islands Regency Health Office, several programs and activities have been implemented to address stunting in the regency, including on local supplementary feeding training for integrated health pos cadres and nutrition education on local supplementary feeding for pregnant women and toddlers. Maternal nutritional status, feeding practices, WASH conditions, infection frequency, and access to healthcare are key determinants of growth in the first two years of a child's life.[10]

Water, Sanitation, and Hygiene (WASH) encompass the concepts of water, sanitation, and hygiene. These three fundamental challenges are grouped together to represent a growing industry because they are closely interconnected.[11] Lack of access to clean water for drinking, cooking, and personal hygiene poses challenges in maintaining health and fighting disease.[12] Inadequate and unhealthy sanitation conditions can lead to contamination of water sources and the rapid spread of disease.[13] Poor WASH conditions can significantly impact the nutritional quality of children under five years of age, leading to stunting.[14]

Research conducted by Mzumara stated that children with good drinking water sources (33.7%) were less likely to experience stunting than children with poor drinking water sources (47.7%).[15] Research in Tanzania shows that interventions to improve water quality can affect nutritional status among children under 5 years of age.[16] Research in Central Sulawesi stated that toilet ownership has a significant relationship with the incidence of stunting.[17] Based on research conducted by Rezki et al. that poor waste management and solid waste management are associated with stunting in children. A meta-analysis of studies showed that WASH interventions can improve the average z-score.[18] Children who received combined WASH

interventions grew better than children who received only one intervention.[19]

The Environmental Health Inspection results in the Langara Community Health Center work area found that only 40.5% of households had adequate wastewater disposal facilities. Furthermore, 42.6% of households had adequate waste disposal facilities, and 53.6% of households had adequate drinking water facilities. A closer look reveals that these achievements fall short of the national target of 100%.

Based on the initial survey in the Langara Community Health Center Working Area, the community has the potential to defecate in the open because the village is close to the coastal area and the lack of proper waste and garbage management, there are still poor hygiene behaviors and there is still a lack of research that examines WASH with stunting incidents in Konawe Islands Regency, especially in the working areas of Langara, Bobolio and Lampeapi Community Health Centers. Therefore, the author wants to know the Analysis of the Relationship between Water (Drinking Water Sources, Processing and Physical Quality of Drinking Water) with the Incidence of Stunting among Children under Five in Konawe Islands Regency.

Method

This type of research is quantitative, Cross Sectional Study design. The study was conducted from February to June 2024 at the Langara, Bobolio and Lampeapi Community Health Centers, Konawe Islands Regency. The population was all toddlers registered in the working area of the Langara, Bobolio and Lampeapi Community Health Centers for the period October to December 2023, totaling 1,125 people and a sample of 89 people obtained using simple random sampling. Data analysis used the Chi-Square test, the Closeness Test and the Binary Logistic Regression Test.

Result

Table 1 showed that of the 89 samples, there were 36 people who had a protected drinking water source and 53 people whose drinking water source was unprotected. Then, of the 36 people who had a protected drinking water source, the majority were not stunted (26 people (72.2%), and a small portion experienced stunting (10 people (32.8%). Furthermore, of the 53 people whose drinking water source was unprotected, the majority experienced stunting (45 people (85.9%), while the rest were not stunted (8 people (15.1%).

The results of statistical analysis using the Chi-Square test obtained a p value of 0.000 < α (0.05), φ (0.577) and X^2 Calculation (29.636) > X^2 Table (3.841), so the alternative hypothesis was accepted and it was concluded that there was a moderate relationship between drinking water sources and the incidence of stunting in toddlers in Konawe Islands Regency.

Table 2 shows that of the 89 samples, there are 56 people whose drinking water management is in the treated category and 33 people who are not treated. Then of the 56 people whose drinking water management is in the treated category, most of them are not stunted as many as 29 people (51.8%) and a small number experience stunting as many as 27 people (48.2%). Furthermore, of the 33 people whose drinking water management is in the untreated category, most experience stunting, as many as 28 people (84.8%), the rest are not stunted as many as 5 people (15.2%). The results of statistical analysis using the Chi-Square test obtained a p value of 0.000 <α (0.05), φ (0.364) and X^2 Calculate (11.894) > X^2 Table (3.841), so the alternative hypothesis is accepted and it is concluded that there is a moderate relationship between drinking water management and the incidence of Stunting in Toddlers in Konawe Islands Regency.

Table 3shows that of the 89 samples, there are 31 people whose drinking water quality is good and 58 people are bad. Then of the 31 people whose drinking water quality is good, most of them are not stunted as many as 20 people (64.5%) and a small number experience stunting as many as 11 people (35.5%). Furthermore, of the 58 people whose drinking water quality is poor, most experience stunting, as many as 44 people (75.9%), the rest are not stunted as many as 14 people (24.1%). The results of statistical analysis using the Chi-Square test obtained a p value of 0.000 <α (0.05), φ (0.396) and X^2 Calculate (13.952) > X^2 Table (3.841), so the alternative

hypothesis is accepted and it is concluded that there is a weak relationship between the quality of Drinking Water and the Incidence of Stunting in Toddlers in Konawe Islands Regency.

Table 1.
The Relationship Between Drinking Water Sources and the Incidence of Stunting

Drinking Water Source	Stunting Incident				Total		*p-value* φ	X^2Count X^2Table
	No Stunting		Stunting					
	n	%	n	%	n	%		
Protected	26	72.2	10	32.8	36	100.0	0,000 0.577	29,636 3,841
Unprotected	8	15.1	45	85.9	53	100.0		
Total	34	38.2	55	61.8	89	100.0		

Table 2.
The Relationship Between Drinking Water Treatment and the Incidence of Stunting

Drinking Water Treatment	Stunting Incident				Total		*p-value* φ	X^2Count X^2Table
	No Stunting		Stunting					
	n	%	n	%	n	%		
Processed	29	51.8	27	48.2	56	100.0	0.001 0.364	11,804 3,841
Unprocessed	5	15.2	28	84.8	33	100.0		
Total	34	38.2	55	61.8	89	100.0		

Table 3.
The Relationship Between Drinking Water Quality and the Incidence of Stunting

Drinking Water Quality	Stunting Incident				Total		*p-value* φ	X^2Count X^2Table
	No Stunting		Stunting					
	n	%	n	%	n	%		
Good	20	64.5	11	35.5	31	100.0	0,000 0.396	13,952 3,841
Bad	14	24.1	44	75.9	58	100.0		
Total	34	38.2	55	61.8	89	100.0		

Discussion

The Relationship Between Drinking Water Sources and the Incidence of Stunting in Toddlers

This study showed that of the 89 samples, the majority of drinking water sources were unprotected. Based on data recapitulation, it was found that the samples' drinking water sources generally came from the Regional Water Company and dug wells. The water used was also uncovered, thus categorizing it as unprotected.

This study also showed that of the 36 people who had a protected drinking water source, the majority were not stunted (72.2%), and a small proportion experienced stunting (32.8%). Furthermore, the sample whose drinking water source was unprotected, the majority experienced stunting (85.9%), while the rest were not stunted (15.1%). The results of the Chi-Square test concluded that there was a moderate relationship

between drinking water sources and the incidence of stunting in toddlers in Konawe Islands Regency.

This research is in line with research[20]which shows that there is a relationship between drinking water sources and the incidence of stunting. Likewise, research by Olo et al. that water factors (unsafe drinking water sources) are related to the incidence of stunting in toddlers in Indonesia.[21] Other research also showed that there was a relationship between drinking water sources (PR 1.394, p=0.042) and the incidence of stunting.[22] Another research also found a relationship between water sources and stunting.[23]

This research is emphasized in the rules[24]Water is a crucial factor in meeting the vital needs of living things, including drinking water and other household needs. For drinking purposes, the water used must be clean. In principle, all water can be processed into drinking water.[25] The sources of quality (suitable) drinking water are as follows:[26] tap water, public taps, public hydrants, water terminals, rainwater reservoirs, springs and protected wells or drilled wells or pump wells that are at least 10 meters away from sewage, waste reservoirs and garbage disposal. Excluding bottled water, water from street vendors, water sold through tanks, well water and unprotected springs.

The Relationship Between Drinking Water Management and the Incidence of Stunting in Toddlers

This study shows that of the 89 samples, most of the drinking water consumed by families is in the treated category, in this case the water consumed is generally boiled before consumption. Then, the samples whose drinking water management is in the treated category, the majority are not stunted (51.8%), and a small portion experience stunting (48.2%). Furthermore, the samples whose drinking water management is in the untreated category, the majority experience stunting (84.8%), the rest are not stunted (15.2%). The results of the Chi-Square test concluded that there is a moderate relationship between drinking water management and the incidence of stunting in toddlers in Konawe Islands Regency.

This research is in line with research[27]which shows that there is a relationship between drinking water treatment and the incidence of stunting. Likewise, research bu Azizah showed that water factors (drinking water treatment) are related to the incidence of stunting in toddlers.[28] Other research also found that eating and drinking management behavior is related to stunting.[29]

This research supports Sastrawijaya's theory that drinking water contaminated with bacteria, viruses, or parasites can cause diarrhea and intestinal infections. Repeated diarrhea in children can lead to chronic malnutrition, a major cause of stunting. Limited access to clean water forces families to use unsafe water sources, increasing the risk of infectious diseases that can compromise a child's nutritional intake and overall health.[30]

The Relationship Between Drinking Water Quality and the Incidence of Stunting in Toddlers

This study showed that of the 89 samples, the majority of the drinking water consumed was of poor quality. Observations showed that the drinking water was colored and cloudy, thus failing to meet the physical water quality requirements for color and turbidity. Furthermore, of the samples with good drinking water quality, most were not stunted (64.5%), while a small proportion (35.5%) were stunted. Furthermore, of the samples with poor drinking water quality, most were stunted (75.9%), while the remainder were not stunted (24.1%).

The results of the chi-square test concluded that there is a weak relationship between drinking water quality and stunting incidence in toddlers in Konawe Islands Regency. This research aligns with research conducted by[14]which shows that there is a relationship between the physical quality of drinking water and the incidence of stunting. Likewise, research by Nasution et al. found that inadequate water quality influences stunting in coastal areas. These factors are still widely practiced in the community but are often overlooked.[31] research by Amalina et al. Also found that there was a relationship between the physical quality of water and the incidence of stunting in toddlers in the Penengahan Health Center work area.[32]

Study by Raharini revealed that if drinking water meets physical, microbiological, chemical, and radiological standards, it is safe for human consumption. Good water is defined as water that is not cloudy, tasteless, odorless, and colorless based on physical criteria. Toddlers who drink cloudy or colored clean water often suffer from

diarrhea. Several studies have shown a link between water quality and stunting in Indonesia. Toddlers are more likely to contract infectious diseases that result in stunting if their drinking water quality does not meet standards.[33]

Another reseach also showed that household drinking water quality was associated with stunting in children aged 6-59 months (p=0.004; OR=4.144), meaning that substandard drinking water quality increased the incidence of stunting in children aged 6-59 months. This study concluded that there was a significant association between household drinking water quality and the incidence of stunting in children aged 6-59 months.[34]

Clean water is water used for daily needs and its quality meets the health requirements for clean water in accordance with applicable laws and regulations and is drinkable when boiled. Drinking water is water that has undergone a processing process or without a processing process that meets health requirements (bacteriological, chemical, radioactive and physical) and can be drunk directly.[35]

Conclusion

There is a link between water (drinking water source, processing, and physical quality) and stunting among toddlers in Konawe Islands Regency. Therefore, it is recommended to maintain water, sanitation, and hygiene by using safe latrines, providing safe waste disposal facilities, burning or burying trash, and practicing handwashing with soap after handling dirty items, and before and after eating.

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