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Utilization of Clean Water as Risk Factors for Cases of Stunting Toddlers

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ABSTRACT

Introduction: Stunting continues to pose a significant public health problem in Indonesia, with a particular impact on children under the age of five. In addition to nutritional factors, environmental sanitation, particularly the application of clean water for food and utensil hygiene, has been pinpointed as a possible contributor.
Objective: The objective of this research was to investigate the correlation between access to clean water and stunted growth in young children living in low-income families.
Method: A cross-sectional study employing a quantitative approach was conducted in a Taguig, engaging 89 mothers of toddlers ranging in age from 24 to 59 months. Participants were chosen using a straightforward random sampling method. Data were gathered using a set of predefined questionnaires and anthropometric assessments. Nutritional status was determined by the World Health Organisation's height-for-age Z-scores. Chi-square tests were conducted for statistical analysis, with a p-value threshold of less than 0.05 being considered statistically significant.
Result: Among the 89 toddlers, 40 (44.9%) were classified as healthy and 49 (55.1%) were identified as stunted**.** Out of children from households with income below 1 million IDR, 28 of them (70%) were of normal stature, whereas 33 (67.3%) were stunted. Clean water was not being optimally used for washing and sanitizing feeding and drinking utensils that were being used by toddlers who were stunted. The statistical link between income and stunting was not found to be significant at a p-value greater than 0.05.
Conclusion: Clean water use, especially for feeding equipment given to toddlers, is crucial for preventing stunting in children. Income levels alone were not strongly linked to a significant association, but hygiene practices tied to water use are still very important. Stunting reduction efforts should therefore include WASH interventions in conjunction with nutritional programs.

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INTRODUCTION

Stunting is a form of chronic malnutrition characterized by impaired linear growth that is not appropriate for a child's age, and it remains a critical public health indicator globally (1). Children who experience stunting suffer not only from delayed physical development but also from reduced cognitive capacity, which has long-term impacts on productivity and health outcomes (2). According to UNICEF, more than 149 million children under the age of five are stunted, primarily in low- and middle-income countries (3).One of the significant contributing factors to stunting is access to and utilization of clean water (4). Poor access to safe water increases the risk of infectious diseases such

as diarrhea and skin infections, which indirectly affect a child's nutritional status (5). Recurrent diarrhea caused by consuming contaminated water can disrupt nutrient absorption and significantly increase the risk of stunting (6).

A study conducted in Ethiopia showed that children living in environments with inadequate Water, Sanitation, and Hygiene (WASH) practices were at a higher risk of stunting than those with access to safe water and proper sanitation facilities (7). Similarly, research from Pakistan revealed that contamination in water sources, such as hand pumps and storage tanks, was a major risk factor for stunting among children under five years old (8).

The World Health Organization (WHO) estimates that up to 50% of all undernutrition cases in children under five are linked to unsafe water, poor sanitation, and inadequate hygiene practices (9). Furthermore, unsanitary environmental conditions may cause environmental enteropathy—a chronic inflammatory condition of the gut resulting from exposure to pathogens—which impairs nutrient absorption and contributes to stunting (10).

Understanding the link between clean water utilization and stunting is essential to formulating integrated public health interventions that combine nutritional programs with environmental health strategies (11).

METHOD

This study used a quantitative cross-sectional design to analyze the relationship between clean water utilization and the incidence of stunting among toddlers. The research was conducted in Taguig, Phillipine during the period of January to March 2024. The location was selected based on a high prevalence of stunting and known variations in access to clean water. The population in this study included mothers with toddlers aged 24–59 months residing in the selected area. A total of 89 respondents were selected using a simple random sampling technique from local health post registries. Data were analyzed using SPSS version Descriptive statistics were used to present frequency and percentage distributions. Chi-square tests were applied to identify associations between clean water utilization and stunting status. Statistical significance was determined at a p-value < 0.05**.**

RESULTS

Table 1. Responden Characteristic's

Responden Characteristic's	Toodler Status				Total (89)	
	Normal 40 (44,9%)		Stunting 49 (55,05%)			
	f	%	f	%		
Income						
< 1 Million	28	31,4	37	41,5	65	73,03
>1 Million	11	12,3	13	14,6	24	27

The majority of both stunted and normal toddlers came from households with a monthly income below 1 million IDR. Specifically, 44,9% of normal toddlers (n=40) and 55,05% of stunted toddlers (n=49) were from low-income families. This finding suggests that low household income is prevalent among both groups, though slightly more common among stunted children. A statistical test using the Chi-square test was conducted to determine the association between household income and stunting status. The analysis showed no statistically significant association between income level and stunting status ($p > 0.05$), indicating that while low income is common, it may not independently determine stunting in this population.

Table 2. Distribution of Personal Hygiene According to Toddler Status

Clean Water Variable	Toodler Status				Total (89)	
	Normal 40 (44,9%)		Stunting 49 (55,05%)			
	f	%	f	%		
Seldom	0	0	4	8,1	4	4,5
Often	14	15,7	29	32,5	43	48,3
Always	20	22,4	22	24,7	42	47,1

The independent variables in this study were wash dishes and drinking utensils with soap and running water (Table 2)

Table 3. Analysis of final Logistic Regression

	P	Odd ratio	Lower Bound	Upper bound
Clean Water Variable	0,002	2,53	0,107	0,500

The results of statistical analysis test using logistic regression indicated that all the variables studies as clean water variables. they were significantly associated with stunting ($p<0.05$). Each of them had a direct proportion of the relationship and became a risk factor for stunting, with the OR values 2,53. (Table 3).

DISCUSSION

Use of Clean Water

The use of clean water for washing dishes and drinking utensils poses the greatest risk to children under five in terms of the incidence of child stunting. The proper use of clean water in washing, feeding, and drinking utensils for toddlers is vitally important in preventing stunting. Contaminated utensils can act as carriers of pathogenic microorganisms, which can cause recurring gastrointestinal infections, including diarrhea. These infections play a substantial role in impeding nutrient absorption, resulting in growth slowdown.(1) Research has found a significant link between inadequate personal cleanliness habits, such as utilising contaminated water for washing items like bottles, spoons, and plates, and a heightened likelihood of stunted growth in youngsters under five years old (13,14). Inadequate bottle and feeding cup cleaning when using contaminated water allows bacteria like Escherichia coli and Salmonella to spread, these bacteria are commonly linked to diarrheal episodes that worsen existing nutritional deficiencies (15).

Studies in rural areas of low-income countries have found that households using untreated or unboiled water to clean children's utensils experience a greater incidence of enteric infections, which in turn contributes to higher rates of stunting (16). This corresponds with the environmental enteric dysfunction (EED) hypothesis, which suggests that long-term exposure to fecal bacteria through contaminated items compromises intestinal integrity, decreases nutrient absorption, and hampers growth (17).

In our research, despite the fact that the majority of participants had access to water sources, the quality of water and sanitation practices surrounding utensil washing were not always satisfactory. The availability of water is not enough on its own; ensuring it is safe from microorganisms and encouraging good hygiene practices are equally crucial elements of stunting prevention strategies (18).

Interventions intended to enhance child growth results must move beyond nutritional supplementation and encompass a broad education on WASH, with an emphasis on using clean water for food and utensil hygiene in child-care practices.

CONCLUSIONS

This research emphasizes the crucial importance of using clean water in preventing stunting among toddlers, especially in low-income families. Most children from stunted and non-stunted families had monthly incomes below one million IDR, implying that socioeconomic factors may exacerbate the consequences of inadequate environmental sanitation. Inadequate usage of clean water for washing feeding utensils and drinking utensils exposes children to repeated infections, which can harm nutrient absorption and impede growth.

The study's results highlight that access to clean water is not enough on its own. Practices like following proper hygiene in food preparation and regularly cleaning utensils are equally crucial in preventing long-term undernutrition. As a result, public health interventions should include WASH education in their approach, prioritizing the safe use of water for feeding toddlers with particular tools, as a means of reducing the overall prevalence of stunting.

CONFLICTS OF INTEREST

All Author Declare No. conflict of interest

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