

Analysis of Wash (Water, Sanitation and Hygiene) on Stunting Toddlers

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Abstract: Child growth and development problems, especially in Indonesia and other developing countries, are mostly caused by two factors: malnutrition and the prevalence of infectious diseases, but also by wash. Stunting is a condition of failure to grow in toddlers due to chronic malnutrition, especially in the period of 1000 first day of Life. The stunting rate in Banjar Regency is still high, indicating the low quality of health services and other services such as sanitation and clean water. The prevalence of stunting in Banjar Regency has fluctuated according to SSGI in 2021 (40.2%), 2022 (26.4%), 2023 (30.6%). This figure in the last 3 years is still far from the National target, which is 14 percent in 2024. Stunting prevention can start from WASH [Water, Sanitation and Hygiene] because all activities are in contact with WASH which includes the concept of water, sanitation, and hygiene. Poor WASH conditions can have a significant impact on the nutritional quality of children under the age of five, causing stunting. Research findings show that implementing interventions focused on water, sanitation, and hygiene (WASH) in Ethiopia can reduce stunting rates by 12%. Kaliukan Village does not yet have proper sanitation and has 242 sanitation sharing and needs to be improved.

Keywords: stunting, availability of cadres, function of cadres, Banjar Regency

1 Introduction

Child growth and development problems, particularly in Indonesia and other developing countries, are largely driven by two main factors: malnutrition and the high prevalence of infectious diseases, as well as issues related to WASH (water, sanitation, and hygiene). One common manifestation is stunting, a condition of growth failure in toddlers caused by chronic malnutrition, especially during the first 1,000 days of life. Stunting impairs brain growth and development, increases the risk of chronic diseases in adulthood, and is linked to low immunity, reduced intelligence, lower productivity, and delayed mental development. Stunting represents a form of growth faltering that results from prolonged nutritional deficiencies, beginning during pregnancy and continuing until the child reaches 24 months of age. It is characterized by inadequate height for

a child's age due to chronic malnutrition or poor diet quality. Unfortunately, stunting often goes unnoticed in communities, as its management is still generalized and the condition is sometimes perceived as normal. In addition, stunting also affects children's oral health.

The prevalence of stunting continues to rise globally. According to UNICEF's 2020 global statistics, an estimated 21.9%—or 149 million—children under the age of five suffer from stunting worldwide[1]. In Southeast Asia, the number reaches 14.4 million. In Indonesia, data from the 2018 Basic Health Research (Riskesdas) showed an improvement in the nutritional status of toddlers between 2013 and 2018, with stunting prevalence declining from 37.2% to 30.8%. More recent data from the 2022 Indonesian Nutritional Status Survey (SSGI) indicated a further decrease, from 24.2% in 2021 to 21.6% in 2022 (a 2.8% drop). However, this figure still falls short of the national target of 14%. In Banjar Regency, SSGI data show fluctuating stunting rates: 40.2% in 2021, 26.4% in 2022, and 30.6% in 2023—remaining far from the 2024 national target of 14%. Stunting hampers both physical and cognitive development, increases the risk of mortality, developmental and learning disorders, and susceptibility to infectious and non-communicable diseases, while also lowering productivity and economic potential. Addressing stunting must therefore be a priority to improve the quality of Indonesia's human resources. Children experiencing stunting in early life are likely to grow into adults with reduced physical and cognitive potential. When stunting occurs between the ages of 0–2 years, it can result in an inability to reach optimal height, incomplete brain development, and academic difficulties later in life.

Stunting prevention can start from WASH (Water, Sanitation and Hygiene) because all activities are in contact with WASH which includes the concept of air, sanitation, and hygiene [2]. Lack of access to clean water for drinking, cooking, and personal hygiene poses challenges in maintaining health and eradicating disease. Inadequate and unhealthy sanitation conditions can lead to contamination of air sources and the rapid spread of disease. Because WASH conditions can have a significant impact on the nutritional quality of children under the age of five, causing stunting. This can occur in several ways, including social, environmental, and economic factors 5 related to health [3].

Research findings completed by Ademas[4] showed that implementing interventions focused on water, sanitation, and hygiene (WASH) in Ethiopia could reduce stunting rates by 12%. This shows that improving hygiene habits has a significant impact on stunting. Additional studies have shown that improving sanitation practices, particularly reducing open defecation, is associated with a 4-37% reduction in stunting rates in rural areas and 20-46% in urban areas [5].

The stunting rate in Banjar Regency is still high, indicating the low quality of health services and other services such as sanitation and clean water. The prevalence of stunting in Banjar Regency has fluctuated according to SSGI in 2021 (40.2%), 2022 (26.4%), 2023 (30.6%). This rate in the last 3 years is still far from the National target, which is 14%. So according to Presidential Regulation Number 72 of 2021 concerning the Acceleration of Stunting Reduction, it regulates the duties and responsibilities of Ministries/Institutions and Regional Governments in accelerating stunting reduction [6]. This is supported by the Banjar Regency Government which is accompanied by the issuance of Banjar Regent Regulation Number 48 of 2020 concerning stunting prevention. So integrated and convergent efforts to reduce stunting have been made, then further efforts must also be made through Wash interventions [7]. Laillou's (2018) research states that specific nutritional interventions and sensitive nutritional interventions are the best way to improve positive nutritional status. Multisectoral interventions in reducing breastfeeding carried out in Cambodia include

anthropometric measurements, infant and child feeding practices (breastfeeding and complementary feeding, feeding frequency, food diversity), Water Sanitation and Hygiene (WASH). The formulation of the problem is how to implement wash (water, sanitation and hygiene) for stunting toddlers in Banjar Regency and the results as an improvement in the health status of stunted toddlers in Banjar Regency.

2 Methods

This research is a quantitative research. This research is an observational analytical study with a cross-sectional approach. The study was conducted in the Banjar district area in high, medium and low case areas. The study population consisted of toddlers aged 0-59 months with a sample of 120 samples. The sampling technique used proportional random with the criteria of not being chronically/ acutely ill and living in the area used as the research sample.

a. Research Instruments

The research instruments used in this study were observation sheets and research questionnaires related to data on parent identity, toddler identity, access to clean water, sanitation conditions, and hygiene information.

b. Data Collection Technique

1. Primary data. The primary data collection technique in this study was obtained using observation sheets and research questionnaires related to data on parent identity, toddler identity, access to clean water, sanitation conditions, and hygiene information.
2. Secondary data. The secondary data collection technique in this study was obtained using documents. Sugiyono[8] stated that documents are records of past events. Documents can be in the form of writing, pictures, or works from someone.

c. Research Variables

The variables studied in this study are the independent variable wash [water, sanitation and hygiene] and the dependent variable stunting toddlers.

d. Data analysis

The act of converting two measurements into in-depth data is called univariate analysis. There are many ways to present a summary, including tables, graphs, and statistical data. For each variable investigated.

1. Univariate

Analysis Univariate analysis is conducted, with the results presented in terms of frequencies and proportions.

2. Bivariate

Analysis The relationship between the independent and dependent variables is examined using bivariate analysis. Given that the data are categorical, the Chi-Square test is the appropriate statistical method. The analysis is performed using SPSS software, with the Chi-Square test applied to obtain the p-value. This p-value is then compared to a predetermined significance level ($\alpha = 0.05$). A p-value less than α indicates a statistically significant association or difference between the two variables.

3 Results and Discussion

This research activity was conducted in Astambul District with 110 respondents of stunting toddler mothers. The following are the results and documentation of the research activities.



Fig. 1. Introduction Survey



Fig. 2. Sampling



Fig. 3. Group Photo



Fig. 4. Observation

3.1 Respondent Characteristics

The description of the age of respondents in Astambul District can be seen in table below.

Table 1. Respondent Age		
Age	Frequency	Percentage [%]
Late adolescence	25	22.7
Early adulthood	60	54.5
Late adulthood	22	20
Early elderly period	3	2.7
Total	110	100

Based on the table above, it is known that the age group of respondents consists of 4 age categories that adjust the categories, namely 25 people (22.7%) in the late adolescence category because the respondents' ages are in the range of 17-25 years. As many as 60 people (54.5%) in the

early adulthood category because they are in the 25-35 year age group. As many as 22 people (20%) in the late adulthood category because they are in the 36-45 year age group. As many as 3 people (2.7%) in the early and late elderly categories because they are in the 46-55 year age group for the early elderly and 56-65 for the late elderly.

The age of most respondents was 25-35 years old, which was included in the early adulthood category. The mother's age factor will affect the mother's ability or experience in providing nutrition to children. Increasingly mature age makes a person not only rely on experience but also increase knowledge from various sources of existing knowledge. Age affects an individual's knowledge, because the more mature an individual is, the more experience he or she has, compared to a younger age. The experience of an individual who is more mature will affect the knowledge within an individual, and they are more capable and strong to achieve their desired goals. The older they are, the more mature a person's level of maturity and strength will be in thinking and working. In terms of public trust, a more mature person is trusted than someone who is not yet mature [9].

3.2 Univariate Analysis

Table 2. Drinking Water Treatment

Drinking Water Treatment	Frequency	Percentage
Process	85	77.3
Unprocessed	25	22.7
Total	110	100%

Based on the table above, it is known that out of 110 respondents, 85 people (77.3%) processed drinking water and 25 people (22.7%) did not process drinking water.

Table 3. Clean Water Source

Clean Water Source	Frequency	percentage
Protected	88	80
Unprotected	22	20
Total	110	100%

Based on the table above, it is clear that out of 110 respondents, 88 people (80%) have a protected clean water source and 22 people (20%) have an unprotected clean water source.

Table 4. Healthy Toilet Ownership

Healthy Toilet Ownership	Frequency	percentage
Proper	103	93.6
Not Proper	7	6.4
Total	110	100%

Based on the table above, it is explained that 103 respondents (93.6%) have decent toilets, and 7 respondents (6.4%) not proper.

Table 5. Waste Management

Waste Management	Frequency	percentage
Bad	71	64.5
Good	39	35.5
Total	110	100%

Based on the table above, it is explained that of the 110 respondents, 71 people (64.5%) had bad waste management, while 39 people (35.5%) had good waste management.

Table 6. Garbage Management

Garbage Management	Frequency	Percentage
Bad	57	51.8
Good	53	48.2
Total	110	100%

Based on the table above, it is explained that of the 110 respondents, 57 people (51,8%) had bad garbage management, while 53 people (48,2%) had good garbage management.

Table 7. Hygiene Behavior

Hygiene Behavior	Frequency	Percentage
Bad	5	4.5
Good	105	95.5
Total	110	100%

Based on the table above, it is explained that 105 (95.5%) respondents have good hygiene behavior and 5 people (4.5%) have bad hygiene behavior.

Table 8. Stunting

Stunting	Frequency	Percentage
Stunting	47	42.7
Not Stunting	63	57,3
Total	110	100%

Based on the table above, it is explained that there are 70 toddlers (63.6%) with stunting and 40 toddlers who are not stunted (36.4%).

3.3 Bivariate Analysis

Bivariate analysis shows the relationship between each WASH variable and the incidence of stunting.

Table 9. Bivariat Analysis

Variable	Stunting	Not Stunting	Total	OR	p-value
Drinking Water Treatment					
Process	28	57	85	4,555	0,021
Unprocessed	13	12	25		
Clean Water Source					
Protected	36	52	88	1,444	0,441
Unprotected	11	11	22		
Healthy Toilet Ownership					
Proper	44	59	103	0,111	0,994
Not Proper	3	4	7		
Waste Management					
Bad	43	28	71	13,438	<0,001
Good	4	35	39		
Garbage Management					
Bad	38	19	57	9,778	<0,001
Good	9	44	53		
Hygiene Behavior					
Bad	5	0	5	2,500	0,008
Good	42	63	105		

3.3.1 The Relationship Between Drinking Water Treatment with the Incidence of Stunting In Toddlers

Based on the results of the analysis, it is known that the drinking water treatment variable there's relationship to the incidence of stunting in Astambul District with a value of [OR = 4.555, p = 0.021]. This is in line with Wahid's research (2020), through the chi square test, the p value is 0.038 [<0.05] which means there is a relationship between drinking water treatment and stunting.

Treating drinking water by boiling/cooking before consuming it can change the quality of drinking water which is protected from microbiology which can be obtained through natural and affordable methods, thereby reducing the incidence of diarrhea which has an impact on the risk of

stunting. The use of refill water in question is water that has previously been treated using filtration and disinfection methods. The filtration process aims to remove the colloidal mixture including pathogenic bacteria in the water and the sterilization process aims to kill pathogens that may still be involved from the previous process before consumption [10].

Treatment of drinking water by boiling or cooking before consumption can improve microbiological quality to reduce the risk of diarrhea, especially for toddlers with malnutrition status, which ultimately has an impact on the risk of stunting. Drinking water before consumption must be ensured to be safe and processed first to prevent disease, one of which is by boiling water until it boils. Boiling water serves to kill pathogens that contaminate water. The temperature used to boil water to eliminate pollution is 100 ° C with the recommended boiling time within 5 minutes, so that it can have the benefit of killing heat-resistant pathogens. Furthermore, drinking water that has undergone treatment is stored in closed and narrow-necked containers in a clean place and out of reach of animals. Drinking water containers should be cleaned when the water runs out or after three days with a final rinse using treated water. Especially if drinking water has been stored for more than three days, because it can cause the population of Coliform and E. Coli bacteria contained to be above the quality standard requirements

3.3.2 The Relationship Between Clean Water Sources with the Incidence of Stunting in Toddlers

Based on the results of the analysis, it is known that the clean water source variable there's no relationship to the incidence of stunting in Astambul District with a value of (OR = 1.444, p = 0.441). Stunting itself can be caused by direct and indirect factors. Direct factors of stunting are the nutrition consumed by mothers during pregnancy, the nutrition consumed by toddlers, and infectious diseases. While indirect factors include water and sanitation. Poor sanitation can cause groundwater pollution, whereas the majority of water sources used by the people of Serang Regency are groundwater or well water taken using an electric pump. The water is used for bathing, washing and some people also consume the water after it has been boiled first.[11].

Clean water that is polluted can cause the risk of diseases such as waterborne disease, which is a disease transmitted by water to humans directly through the water supply and water-washed disease, which is a disease caused by a lack of water for maintaining personal hygiene. Pathogenic germs in water that can cause disease are transmitted to humans through the mouth or digestive system. Some waterborne diseases that are often found are diarrhea, cholera, typhus and hepatitis A.

Based on Lenie M's research in 2024 regarding community empowerment in providing clean water through soil quality mapping, and clean water quality in astambul sub-district, banjar district stated that the relationship between clean water quality and the availability of clean water sources, the best organic material from nature is husk because it can improve physical (DO, NTU, TSS) chemical [Fe, Mn], and bacteriological quality

3.3.3 The relationship between healthy toilets ownership with the incidence of stunting in toddlers

Based on the results of the analysis, it is known that the variable of healthy toilet ownership there's no relationship to the incidence of stunting in Astambul District with a value of (OR = 0.111, $p = 0.994$). This is in line with research by Abidin, et al. (2021) which found a p value of 0.588, which means there is no relationship between family toilet ownership and the incidence of stunting. This is because almost all respondents have had good family toilets such as toilets with strong buildings, goose-neck types, and have a disposal site, namely a septic tank [12].

Unhealthy toilets will cause poor family quality because they can be a medium for transmitting germs from feces through various intermediary media such as air, insects, soil, hands, food, and vegetables [12]. Hygienic disposal of feces can improve family quality by breaking the chain of disease transmission and preventing the transmission of germs from feces to potential hosts [10].

3.3.4 The Relationship Between Waste Management with the Incidence of Stunting in Toddlers

Based on the results of the analysis, it is known that the waste management variable is related to the incidence of stunting in Astambul District with a value of (OR = 13.438, $p = <0.01$). This result is in line with the findings of Soerachmad, et al. (2019) showing statistical results with a p value of 0.000 (<0.05), which means that there is a relationship between household wastewater drainage management and the incidence of stunting.

Good waste management is needed through wastewater collection channels so that it does not become a gathering place for pathogenic microorganisms in the environment around the house which can cause infectious diseases that can lead to stunting, so the safest wastewater drainage channel is to flow into a closed reservoir and there is no standing water around it so that it will reduce the occurrence of clean water pollution from aromas or chemicals and pathogens contained in it. SPAL that does not meet the requirements can be a risk for children to experience growth retardation, this is because SPAL that does not meet the requirements or is not managed properly can cause standing water and unpleasant odors so that it becomes a medium/breeding place for germs and can pollute the quality of water caused by the construction of clean water facilities that do not meet the requirements such as diarrhea, acute respiratory infections or worms that can affect the condition of toddlers' bodies in the process of nutritional intake [20].

3.3.5 The relationship between garbage management with the incidence of stunting in toddlers

Based on the results of the analysis, it is known that the waste management variable is related to the incidence of stunting in Astambul District with a value of (OR = 9.778, $p = <0.01$). This is in line with Soraya, et al 2022, the results of the chi square test were obtained, namely the p value =

0.000 < 0.05, which means that there is a relationship between waste management and the incidence of stunting in toddlers in the Simpang Tuan Health Center work area. Poor waste management can result in stunting. Respondents who do not manage waste will result in waste that is easy to become a place for insects such as flies and cockroaches to land which can be a source of disease. If flies and cockroaches land on food that will be eaten by family members, especially toddlers, they will be at risk of infectious diseases and can have an impact on the incidence of stunting [13].

Based on observations, flies are often found in the kitchen around the trash bins of mothers of toddlers. This is because the trash bins used by mothers of toddlers are not equipped with covers and are not made of waterproof materials. The majority of mothers of toddlers do not have special trash bins in their homes. However, they only use plastic trash bags. Thus, trash bins that are not equipped with covers become an attraction for fly vectors to breed. Germs are carried by fly vectors that land on garbage. If food is infested by these vectors, it can cause infectious diseases in toddlers. This is because fly vectors can carry various microbes such as *Salmonella* spp, *Shigella* spp, *Vibrio cholerae*, and *E. Coli* which can contaminate food and cause diarrhea [14].

3.3.6 The Relationship Between Hygiene Behavior with the Incidence of Stunting in Toddlers

The analysis revealed that the hygiene behavior variable was significantly associated with the incidence of stunting in Astambul Regency (OR = 2.500, $p = 0.008$). This finding is consistent with research conducted which reported a significant relationship between hygiene and stunting ($p = 0.001$). This association can be explained by the mechanism in which poor hygiene increases the risk of infections, particularly in the digestive tract, thereby impairing nutrient absorption in the intestines. Frequent infections in children cause the body to divert energy from growth processes to support the immune response. Moreover, infections can trigger chronic inflammation, further reducing nutrient absorption, leading to chronic malnutrition and ultimately resulting in stunted growth.

The relationship between hygiene and stunting is an important issue because there is a lot of evidence that poor sanitation and hygiene play a major role in increasing cases of stunting. Good hygiene is needed to prevent stunting. Important aspects of hygiene include the practice of washing hands with soap before eating and after using the toilet, which can prevent digestive tract infections such as diarrhea that inhibit nutrient absorption. In addition, good environmental sanitation, including access to adequate sanitation facilities and waste management, as well as the availability of clean water for daily needs, plays a major role in preventing exposure to disease-causing pathogens. Overall, the implementation of good hygiene and sanitation is very important to support child health and prevent stunting [15].

Theoretically, poor hygiene can cause stunting through interrelated biological and epidemiological mechanisms. Chronic malnutrition, which is often the cause of stunting, can be exacerbated by intestinal infections resulting from inadequate hygiene. Children who are exposed to pathogens through contaminated food, water, or hands are susceptible to intestinal infections, such as chronic diarrhea or worm infections. These conditions cause chronic inflammation and impaired absorption of essential nutrients, so that the child's body does not get enough nutrients for

optimal growth, even though food intake is sufficient. The accumulation of these repeated infections can inhibit a child's growth and contribute to stunting [16].

4 Conclusions

The results of bivariate analysis using the chi square test can be concluded that there is a relationship between drinking water treatment, waste management, waste management and hygiene behavior with the incidence of stunting. While the variables of clean water sources and ownership of healthy latrines have no relationship with the incidence of stunting. It is hoped that this study can be a concern for health workers in Astambul District so that they can maintain good WASH conditions and work together with community leaders to provide health promotion to the community about good WASH, especially for mothers of stunted toddlers as an effort to overcome and prevent stunting in toddlers.

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