



Factors Related to the Incidence of Diarrhea among Toddlers

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DOI: <https://doi.org/10.56359/gj.v5i1.367>



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ABSTRACT

Objective: The purpose of this study was to determine the factors related to the incidence of diarrhea in toddlers at Tinambung Health Center.

Method: namely cross sectional. The sampling method was Purposive sampling, the number of samples was 85 toddlers.

Result: Statistical Test using Chi Square test formula to determine factors related to diarrhea incidence, it was found that there is a relationship between knowledge about diarrhea, behavior and consumption of boiled water with diarrhea incidence in toddlers where all factors have p value = 0.000 ($p < 0.05$), meaning that there is a relationship between knowledge about diarrhea, behavior and consumption of boiled water with diarrhea incidence in toddlers.

Conclusion: This study shows a relationship between maternal knowledge, maternal behavior and water consumption in cooking with the incidence of diarrhea in toddlers in the Tinambung Health Center work area with a significant level of $p = 0.000$ for all variables.

Keywords: Diarrhea, Behavior, Knowledge

Introduction

Diarrhea remains one of the leading causes of morbidity across various geographic regions worldwide, affecting individuals of all age groups. However, severe forms of the disease, which have high mortality rates, predominantly occur in infants and young children. In developing countries, children may experience more than 12 episodes of diarrhea annually, accounting for 15-34% of all pediatric deaths (Aman, 2014, as cited in Zubir et al., 2016). In these regions, toddlers typically experience an average of 3-4 diarrhea episodes per year, with

some locations reporting incidences exceeding 9 episodes annually, suggesting that approximately 15-20% of a child's early life may be spent dealing with this condition.

Currently, the diarrhea morbidity rate in Indonesia is estimated at 195 cases per 1,000 population, the highest among ASEAN countries (Soebagy, 2018). Notably, this rate has shown an increasing trend over the years. For instance, in 2016, the morbidity rate soared to 423 per 1,000 population, resulting in 10,980 reported cases and 277 deaths, reflecting a case fatality rate (CFR) of 2.52%. Reports indicate that toddlers in Indonesia suffer an average of 1.6 to 2 cases of diarrhea annually, leading to a nationwide incidence of around 40 million episodes each year, with estimated fatalities between 200,000 and 400,000 among this demographic.

A 2000 survey conducted by the Directorate General of P2MPL at the Ministry of Health, covering ten provinces, revealed that from 18,000 households surveyed, 13,440 toddlers had an average incidence of 1.3 episodes of diarrhea per year (Soebagy, 2016). Furthermore, data from West Sulawesi province in 2017 recorded a diarrhea morbidity rate of 50.84 per 1,000 population, with toddlers comprising 34.56% (19,117 out of 55,309 cases) of those affected (West Sulawesi Health Profile, 2017).

Specific data from the Tinambung Health Center illustrate a fluctuation in diarrhea cases among toddlers over three years: in 2016, there were 88 reported cases (35.48%), which decreased to 74 cases (20.73%) in 2017 but rose significantly to 238 cases (43.75%) in 2018 (Tinambung Health Center Profile, 2018).

The adverse effects of diarrhea on infants and young children can severely impede their growth and developmental processes, ultimately diminishing their overall quality of life (Yasir, 2009). Common complications linked to diarrhea include dehydration—manifesting as mild, moderate, or severe forms—including hypotonic, isotonic, or hypertonic dehydration. Additional complications may involve hypovolemic shock, hypokalemia (with symptoms such as meteorism, muscle hypotonia, weakness, bradycardia, and electrocardiogram changes), hypoglycemia, secondary intolerance due to damage to intestinal mucosal villi and lactose enzyme deficiency, seizures in cases of hypertonic dehydration, and protein-energy malnutrition resulting from prolonged vomiting and diarrhea.

Factors contributing to the incidence of diarrhea include inadequate access to clean water, fecal contamination of water sources, insufficient sanitation facilities, poor disposal practices, lack of personal and environmental hygiene, and improper food handling and storage (Sander, 2015). Research conducted by Eliati (2015) also identified a correlation between access to clean water facilities and the incidence of diarrhea in toddlers seeking treatment at the Badar Health Center in Southeast Aceh Regency, with 81.6% of cases linked to inadequate clean water access, and a 72.2% correlation associated with the availability of toilets.

The observed rise in diarrhea cases correlates closely with various factors, including parental knowledge, attitudes, and the habitual consumption of untreated water, which collectively contribute to the increased incidence of this preventable disease.

Objective

The aim of this study was to determine the factors associated with the incidence of diarrhea in toddlers at the Tinambung Health Center, Tinambung District, Polewali Mandar Regency.

Method

The research employed a cross-sectional design, a methodological approach in which measurements or observations are conducted simultaneously at a single point in time (Hidayat, 2018). This study was carried out within the jurisdiction of the Tinambung Health Center, located in the Tinambung District of Polewali Mandar Regency, from March to May 2023. The target population comprised all mothers with toddlers in the working area of the Tinambung Health Center, totaling 544 mothers.

A sample size of 85 mothers and their corresponding toddlers was determined to appropriately represent the overall population. Inclusion criteria for participants involved the willingness to serve as respondents, the ability to read, write, see, and hear, and the absence of any acute illness.

Data collection was performed utilizing a structured questionnaire and an observation sheet as primary data collection instruments. Prior to administering the questionnaire, a validity and reliability assessment was conducted, resulting in the refinement of 30 initial questions. Following the assessment, one question was deemed invalid and eliminated, leading to a final total of 29 valid questions for use in the study.

Subsequent to validating the questionnaire, data concerning the toddlers and their medical diagnoses were gathered from the Tinambung Health Center. Researchers then visited the participants' homes to distribute the questionnaire and observation sheets. Knowledge and behavior concerning diarrhea were evaluated through interviews with the mothers of the toddlers.

Data analysis involved categorizing responses based on the frequency of each variable and employing cross-tabulation to examine the relationship between maternal knowledge, behavior, and the occurrence of diarrhea. Statistical analysis was conducted using the Chi-Square Test to determine significant associations between the variables of interest and diarrhea incidence. The findings of this study aim to enhance the understanding of factors contributing to diarrhea among toddlers and inform future health interventions in the community.

Result

Respondent Characteristics

The results of the study on the distribution of respondent characteristics are that the respondents' age is in the range of 20-35 years, more female, the highest level of elementary school education, more housewives and income is more <500,000. Can be seen in table 1 below.

Table 1. *Respondent Characteristics*

Characteristics	F	%
Age		
<20 years old	15	17.9
20-35 years old	51	60.7
>35 years old	18	21.4
Education		
Primary School	52	61.9
Secondary Shool	17	20.2
Tertiary School	12	15.9
University	3	14.3
Work		
Housewife	77	91.7
Teacher	3	3.6
Entrepreneur	4	4.8

Research Variables

Based on the results of the study, the level of knowledge of respondents in the range of less than 45.2%, Respondent behavior in the negative range of 53.6%, consumption of boiled water is more than unboiled 57.1% and the incidence of diarrhea is more frequent at 51.2% (Table 2).

Table 2. *Research Variables*

Variables	F	%
Knowledge		
Good	27	32.1
Enough	19	22.6
Less	38	45.2
Behavior		
Positive	39	46.4
Negative	45	53.6
Water Consumption Boiled		
Boiled	36	42.9
UnBoiled	48	57.1
Diarrhea Incident		
occur	43	51.2
Not occur	41	48.8

The results of cross tabulation between the level of knowledge and the incidence of diarrhea (Table 3) show that with good knowledge, diarrhea will not occur, with sufficient knowledge, diarrhea does not occur more often than occurs, and with poor knowledge, diarrhea occurs with a p-value of 0.000. It can be concluded that there is a relationship between maternal knowledge and the incidence of diarrhea in toddlers.

Table 3. Relationship between maternal knowledge about diarrhea and the incidence of diarrhea in toddlers

		Diarrhea Incident		<i>P</i>
		occur	Not occur	
<i>knowledge</i>	<i>Good</i>	0	27	0.000
	%	0.0	32.1	
	<i>Enough</i>	5	14	
%	6.0	16.7		
<i>less</i>	38	0		
%	45.2	0.0		
Total		43	41	
	%	51.2	48.8	

The results of cross tabulation between Behavior and diarrhea incidence (Table 4) show that with positive behavior, diarrhea is more likely to not occur and negative behavior is more likely to occur with a p-value of 0.000. It can be concluded that there is a relationship between maternal behavior and diarrhea incidence in toddlers.

Table 4. Relationship between Maternal Behavior and Diarrhea Incidence in Toddlers

<i>Variables</i>		Diarrhea Incident		<i>P</i>
		occur	Not occur	
Behavior	<i>Positive</i>	5	40	0.000
	%	6.0	47.6	
	<i>Negative</i>	38	1	
%	45.2	1.2		
Total		43	41	
%		51.2	48.8	

The results of cross tabulation between consumption of boiled water and the incidence of diarrhea (Table 5) show that with high consumption of boiled water, diarrhea does not occur and consumption of unboiled water causes more diarrhea with a p-value of 0.000. It can be concluded that there is a relationship between consumption of boiled water and the incidence of diarrhea in toddlers.

Table 4. Relationship between consumption of boiled water and the incidence of diarrhea in toddlers

<i>Variables</i>		Diarrhea Incident		<i>P</i>
		occur	Not occur	
Water	<i>Boiled</i>	5	40	0,000
	%	6	47,6	
	<i>Unboiled</i>	38	1	
%	45,2	1,2		
Total		43	41	
%		51,2	48,8	

Discussion

Relationship Between Knowledge and Diarrhea Incidence

The analysis of maternal knowledge regarding diarrhea in relation to the incidence of this condition among toddlers revealed a significant association. Among respondents with good knowledge, 27 individuals (32.1%) had not reported any cases of diarrhea. Conversely, those with sufficient knowledge showed that 5 respondents (6%) experienced diarrhea, while 14 respondents (16.7%) reported no incidents. Notably, among those lacking knowledge, 38 respondents (45.2%) experienced diarrhea. Statistical analysis using the Chi-Square test produced a significance level (p) of 0.000, indicating a robust relationship between maternal knowledge and diarrhea incidence.

These findings align with Lawrence Green's framework, as referenced by Notoatmojo (2013), which identifies knowledge as a predisposing factor influencing human health behaviors. This perspective is further supported by the World Health Organization (WHO), which suggests that knowledge gained from personal or observed experiences shapes individual behaviors. By enhancing maternal knowledge regarding the causes, signs, and symptoms of diarrhea, health interventions can empower mothers to adopt preventive measures. The data also suggest that the majority of informational support came from health worker-led counseling sessions, enhancing the mothers' awareness of diarrhea and subsequently promoting healthier behaviors.

Relationship Between Behavioral Practices and Diarrhea Incidence

Examining the effect of maternal behavior on diarrhea incidence revealed noteworthy findings. Among respondents exhibiting positive behaviors, 5 individuals (6%) reported no instances of diarrhea, whereas 40 respondents (47.6%) demonstrated positive behavior yet reported diarrhea cases. In contrast, 38 respondents (45.2%) exhibited negative behaviors alongside diarrhea occurrences, while only 1 respondent (1.2%) with negative behavior did not experience diarrhea. The Chi-Square test yielded a significance level (p) of 0.000, confirming a substantial relationship between maternal behavior and diarrhea incidence.

Behavior, according to Skinner (1938) as cited by Notoatmodjo (2003), is the outcome of interactions between environmental stimuli and individual responses. This theory posits that individuals are likely to engage in behaviors they perceive positively and believe are endorsed by their social circles. The results of this study indicate that increased maternal knowledge of diarrhea correlates positively with improved behavioral practices. Furthermore, cultural factors, personal experiences, and influential figures significantly shape maternal behaviors towards health practices concerning diarrhea prevention.

Relationship Between Boiled Water Consumption and Diarrhea Incidence

The investigation into the consumption of boiled water in relation to diarrhea incidents revealed a clear relationship. Among respondents who consumed boiled water, only 2 (2.4%) experienced diarrhea. In contrast, 34 respondents (40.5%) who consumed boiled water did experience diarrhea, whereas 41 respondents (48.8%) who consumed unboiled water reported diarrhea, and 7 (8.3%) did not experience diarrhea. The Chi-Square analysis found a significance level (p) of 0.000, indicating a strong association between boiled water consumption and diarrhea incidence.

Community behaviors, including beliefs and drinking habits, significantly influence water quality and treatment practices, subsequently impacting disease transmission and prevalence

in the population, especially in rural settings where raw water consumption is common. In urban areas, while water is typically treated, waterborne diseases can still arise from improper handling and storage. Factors contributing to waterborne illnesses include contaminated water storage, inadequate sanitation practices, and neglect in washing hands with clean water.

Ensuring access to clean water is crucial to mitigating the spread of infectious diseases. Proper water management practices, such as sourcing water from clean sources, using clean storage containers, employing sanitized methods for water collection, and boiling water prior to consumption, are essential to reduce the risk of diarrhea.

Clean water is vital for human survival, as it constitutes a significant portion of body weight—approximately 55-60% in adults and about 80% in toddlers. In developing countries, including Indonesia, average daily water needs range from 30 to 60 liters per person (Ronald, 2014). The data indicate that over 100 million people in Indonesia lack access to clean water. Moreover, contamination with pathogens such as *E. coli* remains prevalent in more than 40% of regional drinking water supplies. Communities provided with reliable access to clean water exhibit lower diarrhea rates compared to those without such resources.

To effectively reduce the incidence of diarrhea, it is imperative for families to source clean water, safeguard it against contamination from animals, and employ proper storage practices. This includes using clean containers, taking water from protected sources, and ensuring all cooking and dining utensils are sanitized with clean water. By focusing on these essential practices, communities can significantly diminish their risk of diarrhea and ensure better health outcomes for their children.

Conclusion

This study highlights a significant relationship between maternal knowledge, maternal behavior, and kitchen water consumption practices regarding the incidence of diarrhea in toddlers within the Tinambung Health Center working area, with a noted significance level of $p = 0.000$ for all examined variables. These findings underscore the necessity for targeted counseling and educational interventions that focus on two critical areas: enhancing awareness and prevention of diarrhea, and emphasizing the importance of proper water consumption. Educational programs should aim to improve maternal understanding of diarrhea—its causes, symptoms, and prevention strategies—empowering mothers to adopt protective measures and foster healthier practices within their households. Additionally, training sessions should instruct mothers on the significance of using boiled or safe drinking water, along with best practices for water treatment and safe storage to reduce the risk of waterborne diseases in toddlers. Furthermore, further research is encouraged to explore additional factors contributing to diarrhea in young children, such as dietary practices, family economic status, access to healthcare, and household sanitation conditions. Investigating these areas could provide comprehensive strategies for reducing diarrhea incidence among toddlers. By addressing the multifaceted nature of diarrhea, stakeholders can create targeted interventions that not only focus on immediate causes but also consider broader social determinants of health, ultimately enhancing the well-being of children in the community.

Conflict of interest

There is no conflict of interest.

Authors' contribution

Each author contributed equally in all the parts of the research. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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