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Relationship between mother's knowledge and behavior in milk bottle hygiene with diarrhea incidence in infants aged 6-24 months

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Abstract

Background: Diarrhea can be defined as a condition when a person defecates more than three times in 24 hours with a more liquid stool consistency than usual. This disease is related to environmental factors and microorganisms such as bacteria, viruses, parasites, and protozoa are the causes, with the possibility of transmission through oral and vertical routes.

Purpose: To examine the relationship between the level of knowledge and the incidence of diarrhea in infants aged 6–24 months.

Method: This study used an analytical survey method with a cross-sectional approach, involving a total population of 45 respondents. For this study, a total sampling technique was used in sampling. To collect data, this study utilized primary and secondary methods, while data analysis was carried out using the Chi-Square test. A questionnaire was used as an instrument in this study.

Results: From the results of the analysis, $p = 0.000$ ($\alpha < 0.05$) was obtained, which means that there is a relationship between the level of knowledge and behavior of mothers in bottle hygiene with the incidence.

Conclusion: It was found that there was a relationship between maternal behavior in maintaining the hygiene of milk bottles and the incidence of diarrhea in babies aged 6-12 months.

Keywords: Diarrhea; Hygiene; Infants; Knowledge.

INTRODUCTION

Diarrhea is a common illness that can lead to serious outbreaks, often associated with death. This condition is characterized by looser-than-normal stools, usually more than three times a day. This health problem is related to environmental factors and is caused by various microorganisms, such as bacteria, viruses, parasites, and protozoa, which can be spread directly or through the consumption of food and drink. This condition can be triggered by various types of microorganisms such as bacteria, viruses, parasites, and protozoa which can be spread through direct interaction or through food and drink intake. Diarrhea can affect people of all ages, including infants, children, and adults, with varying social

conditions (Pardede, GukGuk, Bate'e, Toruan, & Silaban, 2024).

Nowadays, diarrhea is one of the main causes of morbidity and mortality in children. Diarrhea can occur anywhere in the world and can cause 4% of deaths and contribute to 5% of health-related losses and disabilities. According to the United Nations Children's Fund (UNICEF) in 2020, approximately 1.7 billion children under five years of age experience diarrhea every year, and approximately 480,000 of them die (Pardede et al., 2024).

According to the World Health Organization (WHO), every day around 1.400 children under five years old die, and if accumulated over one year the number reaches approximately 525.000 cases.

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According to Riskesdas 2018 data, around 11.0% of children under five years old in Indonesia experience diarrhea, with the highest prevalence found in North Sumatra (14.2%), then Papua (13.9%) and Aceh (13.8%) (Trisiyani, Syukri, Halim, & Islam, 2021).

According to the 2021 Indonesian Health Profile, diarrhea is a leading cause of death in children aged 29 days to 11 months. In that year, the target number of diarrhea sufferers across all age groups in Indonesia was 33.6%, with the figure for toddlers reaching 23.8%. There is variation in services for diarrhea patients across provinces, ranging from 6.7% in North Sumatra to 68.6% in Banten. For services for toddlers suffering from diarrhea, the difference between provinces ranges from 3.3% in North Sumatra (Pardede et al., 2024).

Baby bottles are a breeding ground for germs and bacteria because they are difficult to clean. Knowledge is an important factor in disease prevention. The greater a mother's knowledge, the greater her ability to play a role in disease prevention, particularly in preventing diarrhea. Mothers' behavior of using unclean bottles or bottles that have been used for hours and left in the open often leads to infection because the bottles can be contaminated with germs/bacteria that cause diarrhea. Therefore, toddlers are at risk of developing diarrhea if mothers do not properly care for their baby bottles (Burhanudin, Arifah, & Setiyawati, 2014).

Based on previous research by Debora on 48 respondents in 2023. The results of the study indicate that the analysis using the chi-square test on maternal behavior in maintaining the cleanliness of milk bottles with the incidence of diarrhea in infants obtained a p-value of 0.000. This value is smaller than 0.05, With the results rejecting H_0 and accepting H_a , it can be concluded that there is a significant relationship between milk bottle hygiene practices by mothers and the incidence of diarrhea in infants aged 6–24 months (Pardede et al., 2024).

Diarrhea is the disease with the second highest mortality rate in the world, especially in children under five, more than 1,200 children under five die every day or around 444,000 children per year (Saputra, Silalahi, & Nasution, 2024). Diare merupakan penyebab kematian utama kedua pada balita di negara berkembang, termasuk Indonesia (Irin & Kurniadi, 2022). Diarrhea remains the leading cause

of death in toddlers. Transmission of diarrhea can occur through the four Fs: finger, fly, fluid, and field, or through the fecal-oral route through food or drink contaminated by enteropathogens, or through direct contact with objects contaminated with feces of an infected person, or through indirect contact with flies. Therefore, one risk factor for diarrhea is inadequate provision of clean water (Sukardi, Yusran, & Tina, 2016).

One of the factors that contributes to the occurrence of recurrent diarrhea is the lack of hygiene in the care of milk bottles (Yantih, Rosbiyanti, Sartika, & Putri, 2025). The role of mothers in preventing diarrhea in babies is very important, one of which is providing clean formula milk (Marianna & Utami, 2022).

RESEARCH METHOD

Research design is a component for conducting research that serves to describe the stages of research implementation while reflecting the researcher's framework of thought. In this study, an analytical survey research type was applied, in which the researcher attempts to identify the mechanisms and factors causing a phenomenon. The next stage is to analyze the dynamics of the relationship between various phenomena, including the relationship between risk factors and impact factors. This study was conducted at Mitra Medika Hospital, Medan City, North Sumatra, with a research period of December 2025. Using a cross-sectional approach, this study examined the relationship between maternal knowledge, attitudes, and practices regarding bottle hygiene, and their effects on the incidence of diarrhea in infants aged 6–24 months.

This research instrument used a questionnaire distributed to respondents and conducted through interviews to determine sample characteristics and obtain an overview of the relationship between mothers' knowledge and behavior regarding bottle hygiene and the incidence of diarrhea in infants aged 6-24 months. The behavioral questionnaire consisted of eight statements using a Likert scale. The statements were both positive and negative, with response options: "Never" (TP) given a score of 1, "Rarely" (JR) given a score of 2, "Sometimes" (KD) given a score of 3, "Often" (SR) given a score of 4, and "Always" (SL) given a score of 5.

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The collected data are presented in the form of a frequency distribution table. This was conducted to obtain a frequency distribution of mothers' knowledge and behavior regarding bottle hygiene and the incidence of diarrhea in infants aged 6-24 months. To determine the correlation between the independent

variable and the dependent variable, a Chi-square analysis was used between the independent and dependent variables, with a statistical significance limit of 0.05. So it is said that (H_0) is rejected and (H_a) is accepted, meaning that the two variables have a statistically significant relationship.

RESEARCH RESULTS

Tabel 1. Distribution Frequency of Responden (N=45)

Variable	Results	P-value
Knowledge (n/%)		0.044
Good	44/97.8	
Poor	1/2.2	
Behavior (n/%)		0.001
Good	43/95.6	
Poor	2/4.4	
Diarrhea (n/%)		
Yes	2/4.4	
No	43/95.6	

The table above shows that the majority of respondents have good knowledge, namely 44 respondents (95.6%), with the majority of good behavior, namely 43 respondents (95.6%), and the majority of respondents do not have diarrhea, namely 43 respondents (95.6%). Based on research conducted at Mitra Medika Hospital in 2025, using the Chi-Square test, the analysis results showed a p-value of 0.044 with $\alpha = 0.05$, so H_0 was rejected and H_a was accepted. This indicates a significant relationship between maternal knowledge levels and the incidence of diarrhea in infants aged 6–24 months. Based on the analysis using the Chi-Square test, the results obtained were that the significant value or p-value was 0.001 and the α value (0.05), H_0 was rejected and H_a was accepted, meaning that there was a significant relationship between maternal behavior and the incidence of diarrhea in infants aged 6–24 months.

DISCUSSION

Diarrhea is a recurring condition characterized by persistent urge to defecate, with stool containing excessive water. This is caused by viruses, bacteria, and parasites. It is characterized by loose or liquid stools, sometimes consisting of only water, occurring three or more times a day. Diarrhea is sometimes accompanied by vomiting, fatigue, fever, loss of appetite, and the presence of blood and mucus in the stool. Diarrhea can affect anyone, from children to adults, and even the elderly. However, toddlers are most susceptible to diarrhea (Ariani, 2022). Among the many types of digestive tract disorders, diarrhea

is one of the most common in infants and children. Many factors can cause diarrhea in toddlers, such as infections caused by bacteria, viruses, and parasites, or impaired intestinal absorption (malabsorption), allergies, chemical poisoning, or toxins contained in food or drinks. Factors contributing to acute diarrhea in toddlers include environmental factors, the mother's level of knowledge, the community's socioeconomic status, and the food or drink consumed. Infants and toddlers are primarily given breast milk and formula. Furthermore, the cleanliness

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of the container used for feeding milk must also be considered (Silvia, Rahmawati, & Erminawati, 2019).

The table shows that the frequency distribution above indicates that out of 45 respondents (100%), only 1 respondent (2.2%) had a level of maternal knowledge classified as poor. Meanwhile, 44 respondents (97.8%) were in the good knowledge category.

The results of the observation process of a particular object are referred to as the knowledge possessed by an individual. Humans make observations through five senses, namely the eyes, ears, nose, tongue, and skin, and most knowledge is obtained through sight and hearing. Thus, knowledge includes various information obtained by individuals through these senses (Diva, 2021).

Several elements that play a role in influencing an individual's level of understanding consist of internal factors such as age, experience, as well as external factors including education, information, social, cultural, economic, and environmental aspects. As a person gets older, their ability to understand and their way of thinking develops so that the knowledge they gain also increases. Individuals with higher education tend to absorb information more quickly and easily. A higher level of education makes a person more rational in responding to information and more considerate of the benefits that can be obtained (Utami & Anshori, 2019).

Based on the results of research conducted by Sudarwati, entitled "The Relationship between the Level of Mother's Knowledge about Diarrhea and the Occurrence of Diarrhea at the Toddler Posyandu Kasun II, Banyukambang Village", in this study, the design used was correlational analytic with a cross-sectional approach. With 37 respondents, the value of $p = 0.000 \leq \alpha = 0.05$ was obtained, which implies that the acceptance of the alternative hypothesis and the rejection of the null hypothesis indicates that maternal knowledge about diarrhea is related to the occurrence of diarrhea in children (Utami & Anshori, 2019).

The table shows that 45 respondents, or 100%, were recorded in the frequency distribution, there were 2 respondents (4.4%) with maternal behavior that was classified as less good, while 43 respondents (95.6%) were included in the good behavior category. Behavior is defined as a person's

response which can be expressed through movement or attitude, not solely through speech or physical actions (Big Indonesian Dictionary).

All human activities, both directly and indirectly, that can be observed by others are called behavior. These activities include various actions such as walking, crying, talking, working, laughing, studying, writing, reading, and so on (Purba & Gloria, 2019).

Based on the results of research by Rahayu Setyaningsih, with the title "The Relationship Between Mother's Behavior in Cleaning Milk Bottles and the Incidence of Diarrhea in Infants in Sale Village, Plaosan District, Magetan Regency", the results show that in the group of mothers who have good behavior in maintaining bottle cleanliness, 3 toddlers (18.75%) suffered from diarrhea. On the other hand, the analysis shows that diarrhea occurred in 13 toddlers (81.25%) who were included in the group of mothers with bad behavior in cleaning bottles. The results of the Chi-Square test $\alpha = 0.05$ showed $p = 0.04$. Because $p < 0.05$, the findings of this study confirm that there is a significant relationship between mother's behavior in cleaning milk bottles and the incidence of diarrhea in children (Setyaningsih & Fitriyanti, 2015).

The table shows that 2 of the 45 respondents (4.4%) did not experience diarrhea, the diarrhea category was 43 respondents (95.6%). Diarrhea refers to a situation where a person experiences more frequent bowel movements. Diarrhea is characterized by three or more loose stools per day, with stools that are looser and different from usual, which is a characteristic of this condition. This condition generally indicates inflammation. Disorders of the digestive system can occur due to the presence of bacteria, viruses, or parasites of various types (Multazmi, Yosephin, Jumiati, Yuliantini, & Pravita, 2021).

Based on the results of research by Rahayu Setyaningsih, with the title "The Relationship between Mother's Behavior in Cleaning Milk Bottles and the Incidence of Diarrhea in Babies. The results of the study show that the incidence of diarrhea is almost the same between the frequent and rare categories (Setyaningsih & Fitriyanti, 2015).

From the results of the research conducted, it was found that the results of the cross tabulation between the relationship between the level of knowledge in the

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hygiene of milk bottles with the incidence of diarrhea. The analysis showed that of the 45 respondents (100%), only 1 respondent (2.2%) with less knowledge was free from diarrhea, and none experienced diarrhea. The level of knowledge included in the good category. who did not experience diarrhea was 1 respondent (2.2%), diarrhea occurred as many as 43 respondents (95.6%). While in the Chi-Square test, the Asymp. Sig value was 0.044, which was smaller than α (0.05), From these results, H_a was accepted, where the results obtained showed a significant relationship between the level of knowledge in the hygiene of milk bottles with the incidence of diarrhea.

This study is supported by a previous study conducted by Maya Sartika, which aims to identify the relationship between maternal knowledge and behavior in cleaning milk bottles with the incidence of diarrhea in children. with 65 respondents. This study found that 75.4% of respondents experienced diarrhea, respondents with poor knowledge were 69.2%, and as many as 60% of respondents were mothers who did not wash their children's milk bottles. Based on the Chi-Square test, a significant relationship was found between the level of knowledge and the incidence of diarrhea, with $p = 0.003$. In addition, the analysis showed a relationship between maternal behavior and the incidence of diarrhea with a p value = 0.000 (Sartika, 2024).

Based on the research that has been done, the cross tabulation analysis between maternal behavior in maintaining milk bottle hygiene and the incidence of diarrhea shows that out of 45 respondents (100%) behavior with the category of bad behavior that did not occur diarrhea was 2 respondents (4.4%), and diarrhea occurred in no respondents. behavior with the category of good behavior that did not occur diarrhea was no respondents, diarrhea occurred in 43 respondents (95.6%). In the Chi-Square test, the Asymp. Sig value is 0.001, which is smaller than α (0.05), so H_a is accepted, which means that the results obtained there is a significant relationship between maternal behavior in milk bottle hygiene and the incidence of diarrhea.

This study is also in accordance with other research, which found through a survey with 48 respondents. Based on the findings of the research that has been carried out, From the results of the

analysis, the null hypothesis is rejected and the alternative hypothesis is accepted, indicating that maternal behavior in cleaning milk bottles is significantly related to diarrhea in infants aged 6–24 months (Pardede, 2024).

Previous research showed that 33 samples taken as case groups showed 21 samples (63.63%) with poor milk bottle hygiene and 12 samples (36.36%) with good milk bottle hygiene, while in the control group there were 11 samples (33.33%) with poor milk bottle hygiene and 22 samples (66.66%) with good milk bottle hygiene. The results of the analysis obtained a p value = 0.014 and OR = 3.5 so it can be concluded that there is a significant relationship between milk bottle hygiene and the incidence of diarrhea (Harris, Heriyani, & Hayatie, 2017).

Meanwhile, previous researchers revealed that the chi-square analysis results obtained an χ^2 value of 4.6 and a table of 3.84. Therefore, the χ^2 value from the table is acceptable, meaning the null hypothesis (H_a) is rejected, indicating there is no relationship between maternal behavior in using bottles and the incidence of diarrhea in infants (Hikmawati & Verawati, 2015). Other research also revealed that maternal behavior, divided into bottle cleaning and preparation, showed no relationship between bottle cleaning and preparation and the presence of *E. coli*. This is thought to be due to other factors influencing diarrhea, such as environmental and individual health factors (hygiene), socio-cultural factors, nutritional factors, and social factors (Paramitha, Soprima, & Haryanto, 2010).

CONCLUSION

Based on bivariate analysis using Chi-Square, a significant relationship was found between the level of knowledge about bottle hygiene and the incidence of diarrhea in infants aged 6–24 months ($p = 0.044$). The results of the study indicate a relationship between the level of knowledge about bottle hygiene and the incidence of diarrhea in infants aged 6–24 months. The results of the study with bivariate analysis using the Chi-Square test, found a relationship between maternal behavior in maintaining milk bottle hygiene and the incidence of diarrhea in infants aged 6–12 months, with a p value = 0.001. The results of the study showed a relationship between maternal behavior in maintaining milk bottle hygiene and the incidence of diarrhea in infants aged 6–24 months.

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