

Breaking The Cycle: Maternal Knowledge, Sanitation, dan Diarrhea Prevention in Toddlers

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ABSTRACT

This research aims to explore the relationship between maternal knowledge and sanitation hygiene with the incidence of diarrhea in young children within the Socah Community Health Center's service area. The study employs a quantitative approach with an observational cross-sectional design. Primary data was gathered using a questionnaire assessing maternal knowledge and daily sanitation hygiene practices. Data analysis was conducted using both univariate and bivariate methods, including the chi-square test. The findings reveal that, among 101 mothers with toddlers who met the inclusion criteria, most had low knowledge (40.6%) and moderately implemented hygiene and sanitation practices (37.6%). Additionally, 47.5% of the children had experienced diarrhea in the past two weeks. The chi-square test showed a significant correlation between maternal knowledge and the occurrence of diarrhea ($p < 0.001$), as well as between hygiene and sanitation practices and the incidence of diarrhea in children ($p < 0.001$). The study concludes that both maternal knowledge and sanitation hygiene significantly affect the occurrence of diarrhea in children in the Socah Community Health Center area. It is recommended that health education regarding diarrhea prevention, personal hygiene, and environmental sanitation be enhanced to reduce diarrhea rates among infants. This research is intended to serve as a foundation for the planning of health support and prevention programs in the Community Health Center's service area.

Introduction

Diarrhea is a major global health issue and a leading cause of death. It ranks as the second leading cause of death in children under five years old worldwide [1] WHO data indicates that by 2024, there will be approximately 1.7 billion cases of diarrheal disease in children under five, resulting in 443,832 deaths annually [2], particularly among toddlers. Toddlers are among the most vulnerable groups to diarrhea due to their immature immune systems and their dependence on parental care for daily living. Ministry of Health data shows that diarrhea remains a

leading cause of morbidity and mortality in toddlers, with incidences tending to increase in environments with poor sanitation.

One factor that plays a significant role in preventing diarrhea is maternal knowledge. Mothers play a key role in maintaining food hygiene, feeding children, monitoring their health, and implementing clean and healthy lifestyles at home. Good knowledge of handwashing, food preparation, bottle hygiene, and warning signs of diarrhea significantly impact the risk of diarrhea in toddlers. Conversely, inadequate knowledge can lead

mothers to fail to take proper preventive measures, increasing the risk of diarrhea.

According to the 2023 Basic Health Research, the prevalence of diarrhea in Indonesia reached 6,391 cases in 2023 [3]. Based on this data, diarrhea in toddlers is one of the most common infectious diseases in East Java. Data from the East Java Central Statistics Agency (BPS) in 2023 showed that there were 6,867 cases of diarrhea in toddlers in Bangkalan [4]. The Bangkalan Health Office's efforts to address diarrhea include outreach. One approach is providing education on hygiene, such as proper handwashing and providing oral rehydration salts (ORS) to toddlers [4].

Mothers are the closest individuals to toddlers and take care of all their needs, such as bathing them, preparing and providing food and drink. Factors that can cause diarrhea in young children include infections caused by *Shigella*, *Escherichia coli*, and *Campylobacter* [5], malabsorption, and contaminated food. Other factors influencing diarrhea include environmental factors, behavioral factors, and maternal knowledge [6]. Diarrhea can occur in infants due to poor maternal hygiene practices, such as not washing hands before feeding or not cleaning cooking and eating utensils [7].

Based on the above background, the researchers intend to conduct further research using a questionnaire on toddlers to determine the level of maternal knowledge and the impact of maternal sanitation hygiene on diarrhea in toddlers at community health centers (Puskesmas). The purpose of this study is due to the increasing incidence of diarrhea in toddlers from year to year. Furthermore, it aims to increase public and maternal awareness in the hope of reducing the incidence of diarrhea. This can help prevent diarrhea, which is a leading cause of death in children under five, as well as improve children's health and quality of life.

Methodology

Research Design

A cross-sectional observational analytic design was chosen for this study, as it allows for the observation of relationships between the variables of interest at a specific point in time. This design is particularly effective for identifying associations between independent variables are maternal knowledge and hygiene sanitation and dependent variables is diarrheal incidence.

Research Stages

The study targeted mothers aged between 20-37 years with toddlers attending the Puskesmas Socah. Using purposive sampling, 101 mothers who met the inclusion criteria were selected. The inclusion criteria involved mothers who had a child under five, and who were either currently experiencing or had recently experienced a diarrhea case. The study also required mothers to voluntarily consent and be able to read and write.

Data Collection was done via structured questionnaires administered by trained staff. The questionnaires assessed the level of maternal knowledge about diarrhea and the application of hygiene practices.

After data collection, all completed questionnaires were verified, and data were coded for entry into SPSS software for analysis. This stage ensured data accuracy and completeness.

The Chi-Square test is particularly effective for testing associations between categorical variables

Procedure and Data Analysis Techniques

Data were analyzed using SPSS version 25. The Chi-Square test assessed the relationships between maternal knowledge, hygiene practices, and diarrheal incidence, with a significance level set at $p < 0.05$.

The questionnaire's validity was assessed using Pearson's Correlation, and reliability was evaluated with Cronbach's Alpha, showing high values of 0.95 for knowledge and 0.94 for hygiene practices

Results and Discussion

Result

Table 1. Analysis of the relationship between maternal knowledge and the incidence of diarrhea

Knowledge	Diarrhea Incidence in Toddlers				Total	%	P Value
	Yes	%	No	%			
Poor	31	64.6	10	18.9	41	40.6	<0,001
Adequate	12	25.0	15	28.3	27	26.7	
Good	5	10.4	28	52.8	33	32.7	
Total	48	47.5	53	52.5	101	100	

In the table above, it can be seen that 31 respondents with poor knowledge experienced diarrhea in their toddlers, 21 respondents with

adequate knowledge experienced diarrhea, and 5 respondents with good knowledge experienced diarrhea in their toddlers.

Table 2. Analysis of the relationship between sanitation hygiene and the incidence of diarrhea

Hygiene Sanitasi	Diarrhea Incidence in Toddlers				Total	%	P Value
	Yes	%	No	%			
Poor	26	54.2	2	3.8	28	27.7	<0,001
Adequate	14	29.2	24	45.3	38	37.6	
Good	8	16.7	27	50.9	35	34.7	
Total	48	47.5	53	52.5	101	100	

In the table above, it can be seen that respondents with poor sanitation hygiene levels and experienced diarrhea in toddlers were 26 respondents, respondents with sufficient

sanitation hygiene and experienced diarrhea in toddlers were 14 respondents and respondents with good sanitation hygiene who experienced diarrhea in toddlers were 8 respondents.

Table 3. Analysis of the results of the chi-square test on the relationship between the level of maternal knowledge and the incidence of diarrhea in toddlers.

Value	df	Asymptotic Significance (2-sided)	
<i>Pearson Chi-Square</i>	26.938 ^a	2	0.001

<i>Likelihood Ratio</i>	29.047	2	0.001
<i>Linear-by-Linear</i>	26.665	1	0.001
<i>Association</i>			
<i>N of Valid Cases</i>	101		

The test used in this study was the chi-square test. The statistical test results obtained a p-value (<0.001) $<\alpha$ (0.05) so that H1 was accepted. This means that it can be seen that

there is a relationship between the level of knowledge of mothers of toddlers and the incidence of diarrhea in toddlers at the Socah Community Health Center.

Table 4. Analysis of the results of the chi-square test of hygiene and sanitation with the incidence of diarrhea in toddlers.

Value		df	Asymptotic Significance (2-sided)
<i>Pearson Chi-Square</i>	33.352 ^a	2	0.001
<i>Likelihood Ratio</i>	37.714	2	0.001
<i>Linear-by-Linear</i>	28.885	1	0.001
<i>Association</i>			
<i>N of Valid Cases</i>	101		

The test used in this study was the chi-square test. The statistical test results obtained a p-value (<0.001) $<\alpha$ (0.05) so that H1 was accepted. This means that it can be seen that there is a relationship between maternal sanitation hygiene and the incidence of diarrhea in toddlers at the Socah Community Health Center.

Discussion

The study results showed a relationship between maternal knowledge and the incidence of diarrhea in toddlers at the Socah Community Health Center. Diarrhea is essentially a condition usually caused by exposure to microorganisms such as bacteria, viruses, and parasites that enter through contaminated food, water, or hands [8] Although the cause is microorganisms, maternal behavior and knowledge significantly influence whether a toddler is exposed.

Mothers who lack knowledge about how diarrhea is transmitted often neglect basic hygiene practices, significantly increasing the risk of microorganisms entering the child's body. On the other hand, mothers who understand the importance of maintaining personal and environmental hygiene are usually more consistent in implementing healthy lifestyle habits, such as washing hands with soap, maintaining food hygiene, and ensuring clean drinking water, thus reducing the risk of germ transmission [9].

Mothers with a good level of knowledge have a lower incidence of diarrhea in toddlers than mothers with less knowledge (Dhar & Majumder, 2019). This aligns with the theory explained in Chapter 2, which states that knowledge is the foundation for shaping a person's behavior, including behavior related to diarrhea prevention [10]. Bloom stated that knowledge encompasses the ability to

understand, apply, and analyze information, which then influences one's actions. The better a mother's knowledge regarding the causes, transmission routes, danger signs, and prevention of diarrhea, the greater the mother's likelihood of implementing proper health practices in toddler care [11]. However, this study still found cases of diarrhea in toddlers cared for by mothers with a high level of education and knowledge. This indicates that maternal knowledge is not the sole factor influencing diarrhea in toddlers. Other factors such as environmental conditions, drinking water quality, actual food preparation behavior, and the child's biology also play a role in diarrhea occurrence, even when the mother has adequate knowledge [12].

Knowledge is a crucial factor in health behavior. Mothers with poor understanding of the causes, prevention, and warning signs of diarrhea are less likely to practice proper health behaviors such as maintaining food hygiene, exclusive breastfeeding, handwashing, or ensuring clean drinking water [13]. This can increase the risk of diarrhea in toddlers. Conversely, mothers with good knowledge are better able to implement preventive measures, resulting in lower rates of diarrhea in their toddlers [14].

Another finding from a study conducted by Meutuah et al. [15] suggests that low knowledge is likely due to low educational levels, given that the majority of mothers in this study were high school graduates. This also suggests that although a high school education is considered sufficient, some understanding remains incomplete. Mothers with low education tend to be difficult to educate, resulting in less concern for personal and environmental hygiene for disease prevention.

Furthermore, hygiene and sanitation are highly influential factors in preventing the transmission of environmentally-based diseases, including diarrhea. This finding aligns with the theory in Chapter 2, which states that hygiene and sanitation are crucial factors in breaking the chain of diarrhea transmission [16]. Poor hand

hygiene, inadequate bathrooms, unsafe drinking water storage, and dirty environments can lead to contamination with diarrhea-causing bacteria such as *E. coli*, *Shigella*, and *Salmonella* [17].

Poor personal hygiene, such as not washing hands with soap, poor nail hygiene, improper food storage, and inadequate sanitation, can facilitate the spread of diarrhea-causing bacteria [18].

Good hygiene and sanitation significantly lower diarrhea rates. However, this study also shows that some toddlers still experience diarrhea even though their mothers have implemented good hygiene and sanitation practices. This condition can be influenced by environmental factors outside the household, such as public sanitation, water quality, and exposure to microorganisms from the surrounding environment or children's play areas, which are beyond the mother's direct control. This demonstrates that clean and healthy living behaviors play a crucial role in reducing the incidence of diarrhea. According to hygiene theory [19], behaviors such as washing hands with soap, maintaining clean nails, and cleaning eating utensils play a significant role in preventing the transmission of diarrhea-causing pathogens. The results of this study support this theory, as mothers with good hygiene practices have been shown to have toddlers with lower rates of [20].

Furthermore, environmental sanitation theory Budge explains that access to clean water and good sanitation influence the risk of diarrheal infections. Storing drinking water in open containers or using dirty containers can become a breeding ground for bacteria. In this study, some respondents still stored drinking water in uncovered containers or used unsafe water sources. This contributed to the high incidence of diarrhea in toddlers.[21]

These findings are consistent with research, which showed that poor drinking water sanitation increases the risk of diarrhea in toddlers and is associated with high child mortality rates[22].

Thus, it can be concluded that hygiene and sanitation practices significantly influence the occurrence of diarrhea in toddlers. Socah Community Health Center needs to continue to improve education regarding environmental hygiene, proper handwashing techniques, and safe drinking water storage to reduce the incidence of diarrhea.

Conclusion

The study results revealed a significant correlation between maternal knowledge and the incidence of diarrhea in toddlers, with a p-value of <0.001 . Mothers with lower levels of knowledge were more likely to have toddlers with a higher incidence of diarrhea compared to mothers with better knowledge. Furthermore, the study also found a significant relationship between sanitation hygiene and the incidence of diarrhea in toddlers ($p < 0.001$), indicating that poor personal hygiene and sanitation practices increased the risk of diarrhea. Overall, both maternal knowledge and sanitation hygiene were found to play significant roles in the incidence of diarrhea in toddlers within the study area.

References

- [1] Muziburrahman M, Husada D, Utomo B. Identification of bacteria causing diarrhea in under-five children using culture methods in Bima, Indonesia. *J Berk Epidemiol*. 2022;10(1):95–102. doi:10.20473/jbe.v10i12022.95-102.
- [2] Santoso A, et al. Penyuluhan edukasi terkait pencegahan dan penatalaksanaan diare pada anak bagi warga Desa Nogosari. *Inov Pengabdian Masy*. 2024;4(2):37–44.
- [3] Aisyiah N, et al. Kualitas sanitasi higiene dengan peningkatan frekuensi diare pada balita. *Health Saf Environ*. 2024:1–9.
- [4] Dinas Kesehatan Jawa Timur. Jumlah kasus penyakit menurut kabupaten/kota dan jenis penyakit.
- [5] Novard MFA, Suharti N, Rasyid R. Gambaran bakteri penyebab infeksi pada anak berdasarkan jenis spesimen dan pola resistensinya di RSUP Dr. M. Djamil Padang tahun 2014–2016. *J Kesehat Andalas*. 2019;8(2S):26. doi:10.25077/jka.v8i2s.955.BPS. 2023:2406.
- [6] Ernawati W, Dhamayanti R, Widiastini PMF. Hubungan tingkat pendidikan dan pekerjaan ibu dengan kejadian diare pada balita. *J Kesehat Terapan*. 2024;10(2):145–152. doi:10.54816/jk.v10i2.762
- [7] Agus A, Joko T. Literature review: Faktor risiko kejadian diare pada balita di Indonesia. *J Kesehat Lingkung*. 2021;11(1):1–7. doi:10.47718/jkl.v10i2.1166.
- [8] Morsy SMH, Dyab AK, Hassan TM. Overview on pathogenesis of diarrhea in infants and children. 2025;55(3):371–382
- [9] Olusegun AJ. Role of hygiene and sanitation practices in diarrhea prevention. 2025.
- [10] Darsini, Fahrurrozi, Cahyono EA. Pengetahuan. *J Keperawatan*. 2019;12(1):97.
- [11] Saadallah OS, Saido GA. Knowledge and practices of mothers about diarrhea in children under three years old in Heevi Pediatric Teaching Hospital in Duhok City. *Polytech J*. 2021;11(1):52–57. doi:10.25156/ptj.v11n1y2021.pp52-57.
- [12] Khofifah Abidin, Ansariadi, MT. Hasanuddin Journal of Public Health. 2022;(3):301–311.
- [13] Szweczek A, Bak J. The knowledge of mothers on prevention of diarrhea in infancy. 2018;8(11):157–164.
- [14] Mandoo ME, et al. Knowledge and practice of mothers in pediatric diarrhea management in Mosul city. 2022.
- [15] Meutuah S, et al. Faktor risiko kejadian diare pada balita di Puskesmas Kota Sigli. 2024;19(3):189–198.
- [16] Bagiastra IK, Damayanti SLP. Pemahaman dan penerapan personal hygiene dan sanitasi pada anak-anak sekolah minggu di Banjar Tri Paratha Perumnas Tanjung Karang Mataram. *Media Bina Ilmiah*. 2019;13(7):1343–1352.
- [17] Ugboko HU, et al. Childhood diarrhoeal diseases in developing countries. *Heliyon*. 2020;6(4):e03690. doi:10.1016/j.heliyon.2020.e03690.
- [18] Soe TK, et al. Hygiene practice and diarrhea prevalence among under-five children in Myanmar: a cross-sectional study. 2024.
- [19] Sukmawati, Abidin UW, Hasmia. Hubungan hygiene dan sanitasi lingkungan terhadap

- kejadian stunting pada balita di Desa Kurma. J Pegguruang Conf Ser. 2021;3(2):495–502.
- [20] João M, Cananda F, Buanango MA. Knowledge and hygiene practices among residents with diarrhea in Tete, Mozambique. 2025;7.
- [21] Budge S, et al. Environmental sanitation and the evolution of water, sanitation and hygiene. Bull World Health Organ. 2022;100(4):286–288. doi:10.2471/BLT.21.287137.
- [22] Mebrahtom S, Worku A, Gage DJ. The risk of water, sanitation and hygiene on diarrhea-related infant mortality in eastern Ethiopia. BMC Public Health. 2022;22(1):1–14. doi:10.1186/s12889-022-12735-7.