Jurnal Info Kesehatan
Vol. 24, No. 1, March 2026, pp. 57-69
P-ISSN 0216-504X, E-ISSN 2620-536X
DOI: *10.31965/infokes.Vol24.Iss1.2164*
Journal homepage: *https://jurnal.poltekkeskupang.ac.id/index.php/infokes*

RESEARCH Open Access

Determinants of Diarrhea Incidence Among Infants: The Role of Maternal Education, Health Information, Exclusive Breastfeeding and Nutritional

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Received: 29 September 2025 Revised: 23 December 2025 Accepted: 2 February 2026

Abstract
Infant diarrhea presents a series of health challenges, including loss of appetite, electrolyte disturbances, undernutrition, increased vulnerability to other infections, and potential delays in physical and cognitive development. This study aimed to examine the determinants influencing the occurrence of diarrhea among infants aged 6–12 months at Independent Clinic of Midwife Meiyuni, S.ST., Bd. The variables explored were maternal educational attainment, exposure to health-related information, exclusive breastfeeding history, and the infant's nutritional status. A cross-sectional analytical approach was employed using a total sampling technique involving 55 infants. Bivariate analysis was conducted through simple logistic regression. The results revealed significant associations of maternal education (R^2 = 33.7%, F = 26.905, p = 0.001), maternal access to health information (R^2 = 28.7%, F = 21.302, p = 0.001), exclusive breastfeeding history (R^2 = 57.6%, F = 71.980, p = 0.001), and nutritional status (R^2 = 55.8%, F = 66.836, p = 0.001) on the incidence of diarrhea. These research findings highlight the importance of improving maternal education and health literacy, promoting exclusive breastfeeding, and enhancing children's nutritional status as key strategies for preventing diarrhea through effective preventive interventions.

Keywords: Diarrhea, Maternal Education, Health Information, Nutritional Status.

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1. INTRODUCTION

Diarrhea remains one of the most prevalent causes of illness and mortality among children under five worldwide, despite global efforts to reduce its impact. The disease is responsible for thousands of deaths annually, with the highest burden in low- and middle-income countries. The primary threat associated with diarrhea is dehydration, which can be life-threatening (Kibibi, 2024). Globally, the prevalence of diarrhea in children was about 10.9% during 2020-2024, while the South East Asia region reported a lower prevalence of 7.3% (Tag et al., 2025). Nevertheless, diarrhea remains a major public health problem. According to the World Health Organization, diarrhea is the second leading cause of death in children under five, resulting the deaths of around 525,s 000 (Tuang, 2021). While in 2024, it is reported that diarrhea was responsible for an estimated 445,000 deaths annually (WHO, 2024). Based on Indonesian Health Survey (SKI) 2023, there were 5.2% of 59.253 children aged 1-4 years experienced diarrhea, while in East Java, the prevalence of diarrhea among under-five children was 4.8% out of 11.502 children (Kementerian Kesehatan Republik Indonesia, 2023).

Diarrhea is defined as the passage of watery or loose stools three or more times within a 24 hour periods, with or without blood or mucus. From an epidemiological perspective, diarrhea is commonly defined as the expulsion of soft or liquid stools three or more times in a single day (Sodikin, 2012). A child can be said to have diarrhea if the volume of is greater than 10 ml/kg/day. Childhood diarrhea repeatedly can lead to malnutrition, stunting, delayed brain development, and significant stress for households (Manetu et al., 2021).

A major cause of the high prevalence of childhood diarrhea is reliance on contaminated open water sources. Poor hygienic practices and inadequate sanitation facilities also contribute significantly to its spread (Nataro, 2013). In regions where diarrhea is prevalent, it may be triggered by various pathogens such as bacteria, viruses, and protozoa. The most common pathogen responsible for these cases is rotavirus, while Campylobacter jejuni is the leading bacterial cause (Gascon et al., 2000). These conditions are still frequently found in many developing regions, including Indonesia, where diarrhea continues to threaten infant health. For example, in February 2023, there were recorded 16 instances of infant visits for treatment of diarrhea reflecting the ongoing public health challenge in local communities.

This study builds upon earlier research by Nikmah & Suminar (2017), which examined the relationship between respiratory tract infections, diarrhea, and contributing factors such as immunization, exclusive breastfeeding, environmental sanitation, and nutritional status, this study extends the focus to explore a more integrated model. Exclusive breastfeeding (EBF) has been shown to significantly reduce the risk of diarrhea in infants. Studies from South Asia and Ethiopia demonstrate that EBF is associated with lower odds of diarrhea and ARI, highlighting its protective effect against these illnesses (Hossain & Mihrshahi, 2024). Not only breastfeeding, but poor nutritional status is associated with a higher risk of ARI and diarrhea, as seen in studies from Indonesia and Uganda (Bbaale, 2011). The novelty of this research lies in its examining the combined influence of maternal education, access to health information, exclusive breastfeeding history, and infant nutritional status on the incidence of diarrhea among infants aged 6–12 months where such model si still rarely explored simultaneously in community midwifery practice in Indonesia.

Previous studies have demonstrated that maternal education and access to health information are strong predictors of child health outcomes, including diarrhea incidence (Demissie et al., 2021). While many previous studies have explored these factors individually, this research integrates them into a single analytical framework to provide a more holistic understanding of how maternal knowledge, behavior, and infant care practices collectively shape child health outcomes. By doing so, it offers fresh insights that can inform targeted, evidence-based interventions to reduce diarrhea-related morbidity and improve child survival.

Therefore, the purpose of this study was to analyze associated factors that lead incidence of diarrhea among infants aged 6–12 months in a private midwifery practice in East Java.

2. RESEARCH METHOD

This study employed an analytical cross-sectional design to examine factors associated with the incidence of diarrhea among infants aged 6–12 months. The research was conducted at a private midwifery practice PMB Meiyuni, S.ST., Bd located in East Java, Indonesia. The study population consisted of all infants aged 6–12 months who received healthcare services at the PMB during the study period from July to September 2023. This age group was selected due to its increased vulnerability to diarrhea, particularly during the transition from exclusive breastfeeding to complementary feeding, which elevates exposure to environmental pathogens. The minimum sample size was calculated using a single population proportion formula with a 95% confidence level, an estimated diarrhea prevalence of 5.2% based on the Indonesian Health Survey (2023), and a margin of error of 5%, resulting in a required minimum sample of approximately 48 infants. Total 55 eligible infants were recruited. Inclusion criteria comprised infants aged 6–12 months, mothers who were willing to participate and able to provide informed consent, and the availability of complete health records at the PMB. Infants with congenital gastrointestinal abnormalities or chronic illnesses were excluded.

The dependent variable in this study was the incidence of diarrhea, defined as the occurrence of three or more loose or watery stools within a 24-hour period, as reported by the mother. Independent variables included maternal education, access to health information, exclusive breastfeeding history, and infant nutritional status. Maternal education was defined as the highest formal education attained. Access to health information referred to the frequency with which mothers received about maternal and child health information. Exclusive breastfeeding history was defined as the provision of only breast milk during the first six months of life without additional food or fluids, except for medicines or vitamins. Nutritional status was assessed using the weight-for-age index (WAZ) according to WHO Child Growth Standards and categorized as normal or abnormal, with underweight and overweight grouped as abnormal.

Data were collected using a structured questionnaire by trained enumerators. The questionnaire captured demographic characteristics, access to health information, breastfeeding practices, and infant health status, including diarrhea incidence. Diarrhea data were obtained through maternal reports regarding the occurrence, frequency, and duration of symptoms, while nutritional status was determined from infant weight records documented in the Maternal and Child Health (KIA) book. The questionnaire's content validity was evaluated by three experts in maternal and child health, and construct validity testing using Pearson Product Moment correlation demonstrated satisfactory results, with all items exceeding the critical correlation value, and the reliability test yielded a Cronbach's Alpha of 0.873.

Data analysis used IBM SPSS Statistics version 25.0. Descriptive statistics were used to summarize respondent characteristics and key study variables, while inferential analysis employed simple logistic regression to examine the association between each independent variable and diarrhea incidence. Logistic regression was chosen due to the dichotomous nature of the outcome variable, and statistical significance was determined at a p-value of less than 0.05. Ethical approval for the study was obtained from the Health Research Ethics Committee of STIKes Ngudia Husada Madura, Indonesia. All participants received a clear explanation of the study objectives, procedures, risks, and benefits prior to data collection, and written informed consent was obtained from all participating mothers.

3. RESULTS AND DISCUSSION

Table 1. Characteristics of Research Respondents.

Respondent Characteristics	∑	**%**
Maternal Education		
Elementary School to Junior High School	24	43.6
Senior High School	21	38.2
Diploma/Bachelor's Degree	10	18.2
Health Information		
Never	25	45.5
Occasionally	25	45.5
Frequently	5	9.1
Exclusive Breastfeeding History		
No	28	50.9
Yes	27	49.1
Nutritional Status		
Abnormal	21	38.2
Normal	34	61.8
Incidence of Infant Diarrhea		
2 months ago or earlier	5	9.1
1 month ago	26	47.3
Currently	24	43.6
Total	55	100

Most mothers had education levels at the elementary to junior high school level (43.6%), followed by senior high school (38.2%) and diploma or bachelor's degree (18.2%). Regarding access to health information, 45.5% of mothers had never received information, and an equal proportion (45.5%) received it only occasionally, while only 9.1% frequently accessed such information. In terms of feeding practices, 50.9% of infants were not exclusively breastfed, while 49.1% received exclusive breastfeeding during the first six months of life. Most infants (61.8%) had good nutritional status, and 47.3% had experienced diarrhea within the past month.

Table 2. Analysis of the Relationship between Maternal Factors and the Incidence of Diarrhea in Infants.

Independent Variable	**Model Summary[b]**	**ANOVA[a]**		**Coefficients[a]**	
	R Square	F	p-value	B	p-value
Maternal Education	0.337	26.905	<0.001	-0.498	<0.001
Health Information	0.287	21.302	<0.001	-0.532	<0.001
Exclusive Breastfeeding History	0.576	71.980	<0.001	-0.970	<0.001
Nutritional Status	0,558	66,836	<0.001	-,982	<0.001

Note: *The dependent variable is incidence of diarrhea in infants.*

Based on the analysis in Table 2, the R^2 value of 0.337 indicates that maternal education explains 33.7% of the variation in infant diarrhea incidence, while the remainder is attributed to other variables. The regression equation obtained was Y = 1.717 - 0.498X, suggesting an inverse relationship: as the level of maternal education increases, the likelihood of diarrhea occurrence decreases. The statistical analysis showed an F-count of 26.905 and a significance level of $p < 0.001$, confirming that maternal education had a significant impact on diarrhea incidence among infants.

The results of this research suggested that a higher level of maternal education correlated with a reduced likelihood of diarrhea in infants. The significance value (sig) of <0.001 indicated that maternal education significantly impacted the incidence of diarrhea in infants. These findings align with previous studies, which found higher rates of diarrhea in children whose mothers had low educational attainment, typically at or below junior high school level. Educated mothers are generally more aware of hygiene practices, nutritional needs, and timely health-seeking behaviors, all of which contribute to reducing the risk of diarrhea (Demissie et al., 2021).

Education equips individuals with the ability to access, interpret, and apply health-related information effectively. Mothers with higher education levels tend to process information more efficiently and are more likely to adopt behaviors that promote child health (Irfan & Sulansi, 2016).People living in urban areas might be more cognizant of their children's symptoms because of more information available in urban areas; this would therefore improve their health awareness (Kawakatsu et al., 2017). A mother's level of education influences her knowledge, perception, and decisions regarding childcare. It fosters a better understanding of essential health practices, such as hand hygiene, safe food preparation, and exclusive breastfeeding, which are key in preventing diarrhea (Atnafu et al., 2020). Mothers with advanced education levels typically possessed superior knowledge concerning fundamental health practices like hand hygiene, sanitation, and safe water management (Solomon et al., 2020). Additionally, they demonstrated increased awareness regarding the significance of exclusive breastfeeding and the provision of nutritious and safe food for their infants (Dagnew et al., 2019). Educated mothers practice good hygiene, better child feeding and weaning practices, and the interpretation of symptoms and enhance timely action on childhood illness, all of which increase a child's resistance against infectious diseases (Florez et al., 2020).

In numerous countries, a negative correlation was observed between the educational attainment of mothers and the occurrence of diarrhea in infants (Atnafu et al., 2020; Demissie et al., 2021). This suggested that as the level of maternal education increased, the probability of infants suffering from diarrhea decreased. This trend arose from the fact that mothers with higher educational backgrounds tended to have better access to healthcare services, adopt more effective hygiene practices, and possess a deeper understanding of the significance of nutrition and fitness for their infants' well-being (Atnafu et al., 2020). The research results highlight the significance of maternal education and comprehension in preventing infant diarrhea. With adequate health education and access to quality healthcare services, mothers could play a pivotal role in improving their babies' health and diminishing the occurrence of diarrhea in infants.

The analysis results from Table 2 indicated an R Square value of 0.287, suggesting that 28.7% of the variability in infant diarrhea incidence could be attributed to the maternal acquisition of health information, while the remaining variance was explained by other factors. Moreover, the analysis yielded an F count of 21.302 with a probability of <0.001, indicating significance below the 0.05 threshold. This suggested that the regression model was effective in predicting the occurrence of diarrhea in infants based on maternal health information acquisition. The regression equation obtained was Y = 1.684 + (-0.532) X, where Y represented the occurrence of diarrhea in infants and X denoted the health information obtained by mothers. The negative coefficient (-) indicated a negative relationship, suggesting that as mothers acquired health information more frequently, the occurrence of diarrhea in infants tended to decrease. The hypothesis testing revealed that the Coefficients Sig value was <0.001, indicating statistical significance as it was smaller than the 0.05 threshold. Consequently, it could be inferred that the health information acquired by mothers significantly affected the incidence of diarrhea in infants.

The findings suggest that when mothers frequently receive health information, the incidence of diarrhea in their infants tends to decrease significantly. This implies that health

education plays a vital role in promoting preventive behaviors and reducing the burden of diarrhea in early childhood. Mothers who regularly receive reliable health information are better equipped to make informed decisions about their children's care. This includes preventive practices such as appropriate sanitation, food hygiene, and handwashing that reduce the risk of diarrheal diseases (Zain et al., 2019). Disseminating information or knowledge about diarrhea is considered very helpful in preventing and treating diarrhea (Sari et al., 2023). When mothers were exposed to health information, they could acquire insights into techniques aimed at lowering the likelihood of infants developing diarrhea. This information encompassed appropriate hygiene measures like handwashing, safe handling, and storage of food, and ensuring a sanitary environment for the baby. Through adopting these practices, mothers could mitigate the chances of their infants experiencing diarrhea (Zain et al., 2019). Access to health information could also lead to changes in the attitudes and behaviors of mothers. Exposure to health-related knowledge not only improves maternal awareness but also influences behavior, such as encouraging exclusive breastfeeding and prompt recognition of diarrheal symptoms. This fosters early intervention and reduces the risk of complications (Solomon et al., 2020)

The exposure to health information obtained by mothers could positively influence the incidence of diarrhea in infants. By being informed about preventive measures, practicing good hygiene, and making informed decisions about breastfeeding, nutrition, and healthcare, mothers could help reduce the occurrence of diarrhea in their babies.

The analysis results from Table 2 indicated an R Square value of 0.576, suggesting that 57.6% of the variability in infant diarrhea incidence could be attributed to the history of exclusive breastfeeding, while the remaining variance was explained by other factors. The analysis yielded an F count of 71.980 with a probability of <0.001, indicating statistical significance as it was smaller than 0.05. Therefore, the regression model could be effectively utilized to predict the occurrence of diarrhea in infants based on the history of exclusive breastfeeding. The regression equation obtained was Y = 1.821 + (-0.970) X, where Y represented the occurrence of diarrhea in infants and X denoted the history of exclusive breastfeeding. The negative coefficient (-) indicated a negative relationship, implying that infants who received exclusive breastfeeding were less likely to experience diarrhea compared to those who did not receive exclusive breastfeeding. In hypothesis testing, the significance level of the Coefficients Sig value was <0.001, which was smaller than 0.05. Thus, it could be concluded that the history of exclusive breastfeeding significantly influenced the occurrence of diarrhea in infants.

The research findings suggested that infants exclusively breastfed were less likely to experience diarrhea than those who were not, with a significance value (Sig) of <0.001, indicating a significant impact of exclusive breastfeeding history on diarrhea incidence in infants. These results aligned with Shumetie et al. (2018), who affirmed the correlation between exclusive breastfeeding and diarrhea occurrence. The research from Delelegn et al (2020) The result of this study also showed that children who did not exclusively breastfeed were more likely to experi- ence acute diarrhea as compared to those children who breastfeed exclusively (Delelegn et al., 2020). The protection conferred by breastfeeding appears to operate via two pathways, decreasing diarrhea incidence as well as duration (Lamberti et al., 2011).

Exclusive breastfeeding referred to the practice of feeding infants only breast milk without adding any other liquids or solid foods during the first six months of life. Several studies consistently showed that exclusive breastfeeding played a protective role against diarrhea in infants (Feleke et al., 2022; Mulatu et al., 2021). The protective effect of exclusive breastfeeding against diarrhea was particularly crucial in areas with limited access to clean water, inadequate sanitation, and food safety. Breast milk was a safe and hygienic source of nutrition, reducing the risk of contamination and infectious diseases that could lead to diarrhea in infants (Shati et al., 2020). These results that found the relationship between the history of

exclusive breastfeeding and the average incidence of diarrhea in infants aged 0-12 months, and the longer infants aged 0-6 months given only breast milk, they have a lower risk of diarrhea by p value of 0.001 (Sari et al., 2023).

Several studies indicated that exclusively breastfed infants were less likely to experience diarrhea compared to those who did not receive exclusive breastfeeding. The protective effect of exclusive breastfeeding depended on the duration, meaning that the longer infants were exclusively breastfed, the greater the reduction in the risk of diarrhea incidence in infants (Mulatu et al., 2021; Shumetie et al., 2018) Therefore, education about the importance of exclusive breastfeeding needs to be given to the mothers. The more mothers who exclusively breastfeed their children, the more that the incidents of diarrhea will decrease. Santika et al., (2020) found that maternal factors also play a role in the occurrence of diarrhea in toddlers. If a toddler is attacked by diarrheas the actions taken will determine the course of the diseases. These actions are infuluenced by variound thing. One of which is kenowledge and attitudes about diarrhea (Sardianti et al., 2021).

The practice of exclusive breastfeeding had a significant protective effect against diarrhea in infants. Breast milk contained vital nutrients and immune factors that helped strengthen the baby's immune system and protect against infections during diarrhea. Promoting and supporting exclusive breastfeeding for the first six months was crucial to reduce the incidence of diarrhea and enhance the overall health and well-being of infants.

The analysis results from Table 2 indicated an R Square value of 0.558, suggesting that 55.8% of the variability in infant diarrhea incidence could be attributed to the nutritional status of infants, while the remaining variance was explained by other factors. The analysis yielded an F count of 66.836 with a probability of <0.001, indicating statistical significance as it was smaller than 0.05. Therefore, the regression model could be effectively utilized to predict the occurrence of diarrhea in infants based on their nutritional status. The regression equation obtained was Y = 1.952 + (-0.982) X, where Y represented the occurrence of diarrhea in infants and X denoted the nutritional status of infants. The negative coefficient (-) indicated a negative relationship, suggesting that infants with good nutritional status were less likely to experience diarrhea. In hypothesis testing, the Coefficients Sig value was <0.001, which was smaller than 0.05. Therefore, it could be concluded that the nutritional status significantly influenced the incidence of diarrhea in infants.

The research findings suggested that infants with good nutritional status were less likely to experience diarrhea, with a significance value (Sig) of <0.001, indicating a significant influence of nutritional status on the incidence of diarrhea in infants. These results were consistent with the studies conducted by Soboksa (2021), which stated that nutritional status was associated with the occurrence of diarrhea (Koyuncu et al., 2020; Soboksa et al., 2021). This research proves that there is relationship between nutritional status andemergency cases of diarrhea in toddlers. Toddler with abnormal nutritional status have a greater chance suffer from diarrhea with a 7 times greater chance big (Sasmito et al., 2023). Malnutrion contributes to weaker immune system, making mukosal defense more prone to infection (Kefale et al., 2021; Iskandar et al., 2015). The research conducted by Nikmah (2017) on Factors Influencing the Incidence of ARI and Diarrhea in Toddlers in the Village of Jaddih, Socah Sub-district, Bangkalan Regency, showed that there was a correlation between nutritional status and the incidence of diarrhea in toddlers, with a p-value of 0.018. Although conducted on different subjects, these findings supported the notion that nutritional status was associated with the occurrence of diarrhea, children under-five children diarrhea was significantly associated with nutritional (Nikmah & Suminar, 2017).

The relationship between nutritional status and the occurrence of diarrhea in infants has been widely documented. Malnutrition, both inadequate and excessive nutrition, could increase infants' susceptibility to diarrhea. Malnutrition, characterized by inadequate intake of essential nutrients, weakened the immune system and impaired the body's ability to fight infections,

including those causing diarrhea. Infants with malnutrition often had weak intestinal defenses, making them more vulnerable to diarrheal pathogens. Furthermore, malnutrition could lead to deficiencies in key nutrients such as vitamin A, zinc, and iron, which played crucial roles in maintaining a healthy immune system and preventing diarrhea. Alternatively, excessive nutrient intake, notably from high-calorie yet low-nutrient foods, could also heighten the likelihood of diarrhea in infants. This overnutrition might result in obesity, which correlated with changes in gut microbiota and weakened immune function, making infants more prone to infections, including diarrhea (Soboksa et al., 2021).

Additionally, the nutritional condition of mothers during pregnancy and breastfeeding could affect the infant's nutrient status and influence the likelihood of diarrhea. Maternal malnutrition could lead to infants born with low birth weight and weakened immune systems, increasing their vulnerability to diarrheal infections (Atnafu et al., 2020; Solomon et al., 2020). Enhancing the nutritional well-being of infants was vital in decreasing diarrhea occurrences. Sufficient and suitable nutrition, such as exclusive breastfeeding for the initial six months, contributed to supplying vital nutrients and immune components essential for overall infant health and immune system strength, thereby decreasing diarrhea risks. Introducing complementary foods at the right time and ensuring they offered adequate nutrition were necessary to achieve a balanced diet that fulfilled the infant's requirements (Koyuncu et al., 2020).

Both inadequate and excessive nutrition could increase infants' susceptibility to diarrhea. Ensuring sufficient and suitable nutrition, alongside access to clean water and adequate sanitation, was essential in preventing and decreasing the incidence of diarrhea in infants.

4. CONCLUSION

This study highlights that maternal education, access to health information, exclusive breastfeeding practices, and infant nutritional status play an important role in reducing the incidence of diarrhea among infants aged 6–12 months. Mothers with better knowledge and information access tend to adopt healthier feeding and caregiving practices, which contribute to lower diarrhea risk. These findings emphasize the importance of strengthening health education, promoting exclusive breastfeeding, and ensuring routine nutritional monitoring within community midwifery services. Integrating these strategies into primary maternal and child health programs may support effective diarrhea prevention.

REFERENCES

Atnafu, A., Sisay, M. M., Demissie, G. D., & Tessema, Z. T. (2020). Geographical disparities and determinants of childhood diarrheal illness in Ethiopia: further analysis of 2016 Ethiopian Demographic and Health Survey. *Tropical medicine and health*, 48(1), 64. https://doi.org/10.1186/s41182-020-00252-5

Bbaale E. (2011). Determinants of diarrhoea and acute respiratory infections among under-fives in Uganda. *Australasian Medical Journal*, 4(7), 400–409. https://doi.org/10.4066/AMJ.2011.723

Dagnew, A. B., Tewabe, T., Miskir, Y., Eshetu, T., Kefelegn, W., Zerihun, K., ... & Teka, T. (2019). Prevalence of diarrhea and associated factors among under-five children in Bahir Dar city, Northwest Ethiopia, 2016: a cross-sectional study. *BMC infectious diseases,* 19(1), 417. https://doi.org/10.1186/s12879-019-4030-3

Delelegn, M. W., Endalamaw, A., Belay, G. M., & Pediatric Health, M. and T. (2020). Determinants of Acute Diarrhea Among Children Under-Five in Northeast Ethiopia : Unmatched Case – Control Study. *Pediatric Health, Medicine and Therapeutics,* 2020(11), 323–333. https://doi.org/10.2147/PHMT.S256309

Demissie, G. D., Yeshaw, Y., Aleminew, W., & Akalu, Y. (2021). Diarrhea and associated factors among under five children in sub-Saharan Africa: Evidence from demographic and health surveys of 34 sub-Saharan countries. *PloS one*, 16(9), e0257522. https://doi.org/10.1371/journal.pone.0257522

Feleke, Y., Legesse, A., & Abebe, M. (2022). Prevalence of Diarrhea, Feeding Practice, and Associated Factors among Children under Five Years in Bereh District, Oromia, Ethiopia. *Infectious diseases in obstetrics and gynecology,* 2022, 4139648. https://doi.org/10.1155/2022/4139648

Florez, I. D., Niño-Serna, L. F., & Beltrán-Arroyave, C. P. (2020). Acute Infectious Diarrhea and Gastroenteritis in Children. *Current infectious disease reports,* 22(2), 4. https://doi.org/10.1007/s11908-020-0713-6

Gascón, J., Vargas, M., Schellenberg, D., Urassa, H., Casals, C., Kahigwa, E., Aponte, J. J., Mshinda, H., & Vila, J. (2000). Diarrhea in children under 5 years of age from Ifakara, Tanzania: a case-control study. *Journal of clinical microbiology,* 38(12), 4459–4462. https://doi.org/10.1128/JCM.38.12.4459-4462.2000

Hossain, S., & Mihrshahi, S. (2024). Effect of exclusive breastfeeding and other infant and young child feeding practices on childhood morbidity outcomes: associations for infants 0-6 months in 5 South Asian countries using Demographic and Health Survey data. *International breastfeeding journal,* 19(1), 35. https://doi.org/10.1186/s13006-024-00644-x

Irfan, S., & Sulansi, S. (2016). Employment, Knowledge and Latrine Ownership as Risk Factors and Prediction Model of Diarrhea Incidence. *International Journal of Public Health,* 5(2), 158-163. http://doi.org/10.11591/ijphs.v5i2.4780

Iskandar, W. J., wayan Sukardi, I., & Soenarto, Y. (2015). Risk of nutritional status on diarrhea among under five children. *Paediatrica Indonesiana*, 55(4), 235-238. https://doi.org/10.14238/pi55.4.2015.235-8

Kawakatsu, Y., Tanaka, J., Ogawa, K., Ogendo, K., & Honda, S. (2017). Community unit performance: factors associated with childhood diarrhea and appropriate treatment in Nyanza Province, Kenya. *BMC Public Health,* 17(1), 202. https://doi.org/10.1186/s12889-017-4107-0

Kefale, B., Bedada, D., Negash, Y., & Gobebo, G. (2021). Determinants of diarrhea among children under age five using generalized linear model with Bayesian approach: the case of Kuyu General Hospital, Oromia Region, Ethiopia. *Clinics Mother Child Health,* 18(S11), 1-9. Retrieved from https://www.walshmedicalmedia.com/open-access/determinants-of-diarrhea-among-children-under-age-five-using-generalized-linear-model-with-bayesian-approach-the-case-of.pdf

Kementerian Kesehatan Republik Indonesia. (2024). *Survei Kesehatan Indonesia* (SKI) 2023 dalam Angka. Jakarta: Badan Kebijakan Pembangunan Kesehatan, Kementerian Kesehatan Republik Indonesia. Retrieved from https://www.badankebijakan.kemkes.go.id/ski-2023-dalam-angka/

Kibibi W. J . (2024). The Role of Oral Rehydration Therapy in Managing Diarrhea in Children. *Research invention journal of biological and applied sciences* , 4(3), 58–62. https://doi.org/10.59298/RIJBAS/2024/435862

Koyuncu, A., Simuyandi, M., Bosomprah, S., & Chilengi, R. (2020). Nutritional status, environmental enteric dysfunction, and prevalence of rotavirus diarrhoea among children in Zambia. *PloS one,* 15(10), e0240258. https://doi.org/10.1371/journal.pone.0240258

Lamberti, L. M., Fischer Walker, C. L., Noiman, A., Victora, C., & Black, R. E. (2011). Breastfeeding and the risk for diarrhea morbidity and mortality. *BMC public health*, 11 Suppl 3(Suppl 3), S15. https://doi.org/10.1186/1471-2458-11-S3-S15

Manetu, W. M., M'masi, S., & Recha, C. W. (2021). Diarrhea Disease among Children under 5 Years of Age: A Global Systematic Review. *A Global Systematic Review. Open Journal of Epidemiology*, 11, 207–211. https://doi.org/10.4236/ojepi.2021.113018

Mulatu, T., Yimer, N. B., Alemnew, B., Linger, M., & Liben, M. L. (2021). Exclusive breastfeeding lowers the odds of childhood diarrhea and other medical conditions: evidence from the 2016 Ethiopian demographic and health survey. *Italian journal of pediatrics,* 47(1), 166. https://doi.org/10.1186/s13052-021-01115-3

Nataro, J. (2013). Diarrhea Among Children in Developing Countries. In: Curtis, N., Finn, A., Pollard, A. (eds) Hot Topics in Infection and Immunity in Children IX. *Advances in Experimental Medicine and Biology,* 764. New York: Springer. https://doi.org/10.1007/978-1-4614-4726-9_5

Nikmah, N., & Suminar, E. (2017). Faktor-Faktor Yang Mempengaruhi Kejadian ISPA dan Kejadian Diare Pada Balita di Desa Jaddih Kecamatan Socah Kabupaten Bangkalan. *Jurnal INKES (Insan Kesehatan),* 9(1), 34-46.

Santika, N. K. A., Efendi, F., Rachmawati, P. D., Has, E. M. M. A., Kusnanto, K., & Astutik, E. (2020). Determinants of diarrhea among children under two years old in Indonesia. *Children and Youth Services Review*, 111, 104838. https://doi.org/10.1016/j.childyouth.2020.104838

Sardianti, S., Natalia, S., & Utami, R. S. (2021). Factors related to diarrhea in children in the working area of puskesmas pancur, 2020. *Jurnal Vokasi Keperawatan (JVK),* 4(1), 286–299. https://doi.org/10.33369/jvk.v4i1.16440

Sari, G. M., Prawito, P., & Kusyani, A. (2023). *Pemberian edukasi tentang diare terhadap tingkat pengetahuan ibu dalam pencegahan diare pada anak*. *Journal of Nursing and Midwifery Science,* 2(Oktober), 23–32.

Sasmito, P., Setyosunu, D., Sadullah, I., Natsir, R. M., & Sutriyawan, A. (2023). Riwayat status gizi, pemberian ASI Ekslusif dan kejadian diare ada balita. *Holistk Jurnal Kesehatan*, *17*(05), 431–438.

Shati, A., Khalil, S., Asiri, K., Alshehri, A., Deajim, Y., Al-Amer, M., Alshehri, H., Alshehri, A., & Alqahtani, F. (2020). *Occurrence of Diarrhea and Feeding Practices among Children below Two Years of Age in Southwestern Saudi Arabia. Int J Environ Res Public Health,. 17*(3), 722-730. https://doi.org/10.3390/ijerph17030722

Shumetie, G., Gedefaw, M., Kebede, A., & Derso, T. (2018). Exclusive breastfeeding and rotavirus vaccination are associated with decreased diarrheal morbidity among under-five children in Bahir Dar, northwest Ethiopia. *Public health reviews*, 39, 28. https://doi.org/10.1186/s40985-018-0107-6

Soboksa, N. E., Gari, S. R., Hailu, A. B., & Mengistie Alemu, B. (2021). Childhood Malnutrition and the Association with Diarrhea, Water supply, Sanitation, and Hygiene Practices in Kersa and Omo Nada Districts of Jimma Zone, Ethiopia. *Environmental health insights*, 15, 1178630221999635. https://doi.org/10.1177/1178630221999635

Sodikin, S. (2012). *Keperawatan Anak Gangguan Pencernaan*. Jakarta: EGC.

Solomon, E. T., Gari, S. R., Kloos, H., & Mengistie, B. (2020). Diarrheal morbidity and predisposing factors among children under 5 years of age in rural East Ethiopia. *Tropical medicine and health*, 48, 66. https://doi.org/10.1186/s41182-020-00253-4

Tag, Z. M., Alashwal, H., Chemaitelly, H., & Abu-Raddad, L. J. (2025). Global childhood diarrhoea prevalence and its determinants: a systematic meta-analytic assessment, 1985–2024. *EBioMedicine*, 121, 105956. https://doi.org/10.1016/j.ebiom.2025.105956

Tuang, A. (2021). Analisis analisis faktor yang berhubungan dengan kejadian diare pada anak. *Jurnal Ilmiah Kesehatan Sandi Husada,* 10(2), 534-542. https://doi.org/10.35816/jiskh.v10i2.643

WHO. (2024). *Diarrhoeal disease*. Geneva: WHO. Retrieved from https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease

Zain, R. S. M., Primanagara, R., Naldi, Y., & Nurbaiti, N. (2020, April). The Influence of Giving Information on Diarrhea Management to the Knowledge and Attitude of the Mother Carrying Infants in the Primary Health Care in Sitopeng Cirebon. *In International Conference on Agriculture, Social Sciences, Education, Technology and Health (ICASSETH 2019),* pp. 282-284. https://doi.org/10.2991/assehr.k.200402.066