

Profile of Children with Diarrhea at Tanah Kali Kedinding Primary Health Center

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ABSTRACT

Background: The second-highest diarrhea cases, with a total of 151,878 cases with a prevalence of 7.6%, were achieved by East Java. Surabaya itself consists of 78,463 cases, which is almost 50% of all cases in East Java. In 2018, as many as 57.8% of toddlers under 5 years old were found to be positive for rotavirus at the Tanah Kali Kedinding Health Center. **Objective:** The purpose of this study was to describe the profile of the risk factors for diarrhea, including host and environmental factors. **Method:** This study used a descriptive approach method and interviews with parents or caregivers of toddlers with diarrhea who came to the Tanah Kali Kedinding Health Center in October 2024. Sampling using the purposive sampling technique was carried out based on certain considerations from the researcher. The inclusion criteria in this study were toddlers aged 0-59 months and recorded as having acute diarrhea in the Tanah Kali Kedinding Health Center, and parents were willing to be subjects for interviews. **Result:** This study showed the characteristics of toddlers with diarrhea under 1 year old: 34% were female toddlers, 52% had normal nutritional status, 72% were exclusively breastfed, and 38% were vaccinated against rotavirus. Environmental, social, and economic characteristics show the use of refilled water is 48%, ownership of toilets is 100%, the highest level of maternal education is high school 54%, family income above UMK is 52%, mothers do not work 86%, mothers' knowledge level is sufficient 50%, and mothers' hand washing habits meet the requirements 90%.

Keywords: diarrhea; under five years old; risk factors, communicable disease.

INTRODUCTION

Diarrhea is the third most common cause of mortality for children under five, accounting for approximately 443,832 fatalities annually, according to WHO data [1]. Around 9% of Indonesians were found to have diarrhea, with toddlers having the highest rate (16.7%), according to Riskesdas [2]. In 2017, there were 21 Extraordinary Incidents (KLB) of diarrhea that spread to 12 provinces and 17 regencies/cities, resulting in 1,725 cases and 34 fatalities (CFR 1.97%) [3]. Rotavirus and Escherichia are the main causes of mild to severe diarrhea in low-income developing nations [1]. The most significant cause of diarrheal episodes in newborns and young children is rotavirus. Children under the age of five who contract this disease experience severe diarrhea and dehydration. About 70–80% of children's cases of acute diarrhea are caused by viruses [4]. Compared to other gastroenteritis pathogens, rotavirus infection is more common among infants and young children who suffer from severe dehydration [5].

Age under two years, unboiled tap water use, malnourishment, a history of low birth weight, having an uneducated mother, and poor personal cleanliness, such as using a private restroom, are some risk factors for rotavirus infection [6]. Children who are exposed to rotavirus may get dehydrated and may need to be sent to the hospital. In order to boost the body's protection against rotavirus infection, it is advised to administer the rotavirus vaccine [7].

Furthermore, with 151,878 cases overall and a frequency of 7.6%, East Java had the second-highest number of diarrhea cases. 78,463 cases, or nearly 50% of all cases in East Java, are found in Surabaya alone [8]. According to data on the number of instances of diarrhea in children treated at health centers, Sememi Health Center, Sidotopo Wetan Health Center, and Rangkah Health Center rank among the top three. According to earlier research conducted at Tanah Kali Kedinding Health Center, 57.8% of toddlers under the age of five had diarrhea

caused by Rotavirus; that is, 67 toddlers out of 116 in the sample tested positive for the virus [9]. In order to gather data on risk factors linked to the prevalence of toddler diarrhea in the Tanah Kali Kedinding Health Center's service area, researchers are interested in performing a profile study of toddlers who have diarrhea at the Tanah Kali Kedinding Health Center in Surabaya City.

METHOD

This study used a descriptive approach by distributing questionnaires to parents or caregivers of toddlers who brought toddlers with diarrhea to the Tanah Kali Kedinding Health Center in November 2024. The total sample in the study that met the inclusion criteria in this study was 50 toddlers with diarrhea brought by parents or caregivers to the Tanah Kali Kedinding Health Center. Sampling using the purposive sampling technique was carried out based on certain considerations from the researcher. The inclusion criteria in this study were toddlers aged 0-59 months and recorded as having acute diarrhea in the Tanah Kali Kedinding Health Center medical records, and parents/caregivers were willing to be subjects for interviews.

Data collection techniques were carried out by interviews using instruments in the form of questionnaires. The data used were primary data from interviews through questionnaires. Data were analyzed univariately without bivariate. The variables of this study were host and environment (ecology and socio-cultural economy). The host variables studied were age, gender, nutritional status, exclusive breastfeeding, and rotavirus vaccination status. The environmental variables studied were drinking water sources, toilet ownership, maternal education level, family income, maternal occupation, maternal knowledge level, and maternal handwashing habits.

RESULT AND DISCUSSION

Based on the results of this study listed in Table 1. Table 1 describes the characteristics of toddlers with diarrhea. It reveals that the majority of toddlers with diarrhea are younger than two years old, particularly those between the ages of 0 and 11 months. Diarrhea in toddlers is less common as they become older.

TABLE 1: The Characteristics of Toddler Ages.

Toddler Age	Frequency (n)	Percentage (%)
0-11 months	17	34%
12-23 months	14	28%
24-35 months	11	22%
36-47 months	4	8%
48-59 months	4	8%
Total	50	100%

According to research, children younger than two years old had the greatest rates of diarrhea. Over 80% of children under the age of two participated in this study. The age groups of 6–23 months (41.8%) and younger than 6 months (24.7%) had the highest rates of rotavirus-positive cases [10].

According to other research, the age groups of 11–19 months and 20–28 months have the highest rotavirus prevalences, with 22 and 27 cases, respectively [11]. Toddlers under the age of five are more prone to contract rotavirus, the most frequent cause of diarrhea in toddlers, and the number of cases will decline with age. According to a different study, children ages 0–12 months had the highest prevalence of rotavirus infection (60.9%), followed by those ages 13–24 months (19.57%) and 25–36 months (8.69%) [12]. Toddlers are particularly susceptible to infectious infections that affect the digestive system, particularly diarrhea. Due to their still-impaired immune systems, kids under the age of two will be particularly at risk. Furthermore, because they are so active, toddlers frequently put things in their mouths [13].

TABLE 2: The Characteristics of Toddler Gender.

Toddler Age	Frequency (n)	Percentage (%)
Female	26	52%
Male	24	48%
Total	50	100%

Table 2 provides a description of the gender-specific characteristics of toddlers with diarrhea, indicating that female toddlers had the highest prevalence of diarrhea. According to a study, diarrhea is more common in females (51%) than in boys [6]. Girls were more likely than boys to have diarrhea (22.89%) among study participants, according to research conducted in the Bankura, West Bengal, slums [14]. Compared to boys, girls have a lower level of immunity [15]. Other research supports this, stating that girls are more prone to diarrhea because they are less likely than male toddlers to receive exclusive breastfeeding. This will impact the immunity of female toddlers and increase their vulnerability to infection with diarrhea-causing pathogens [16]. However, contrary data indicates that some genders are more likely to get diarrhea than others. Males had higher rates of diarrhea, according to research from Sanglah General Hospital in Denpasar [17]. According to research, rotavirus-induced diarrhea was more common in males at younger ages and more common in females at older ages; these findings were linked to behavioral and occupational characteristics [18].

TABLE 3: The Characteristics of Nutritional Status.

Nutritional Status	Frequency (n)	Percentage (%)
Obese	2	4%
Overweight	2	4%
Normal	36	72%
Wasted	6	12%
Severely Wasted	4	8%
Total	50	100%

Table 3 describes the features of the nutritional status of toddlers who have diarrhea. It demonstrates that the majority of toddlers who have diarrhea have normal nutritional status.

Nutrition and infectious diseases have a close relationship. A healthy diet will strengthen the body's defenses. Reinfection will come from a reduction in daily nutritional intake if infected. Additionally, malnutrition impairs the body's defenses against infections, which makes infection more likely. According to a study conducted in Northeastern Kenya, there is a reciprocal association between malnutrition and diarrhea, meaning that diarrhea can lead to malnutrition and malnutrition can lead to diarrhea [6]. Infants that are malnourished have a six-fold increased risk of developing diarrhea [19]. Children who are malnourished experience diarrhea as a result of pancreatic atrophy, small intestine villi atrophy, poor food absorption, and weakened immunity.

This runs counter to studies that found a strong correlation between non-thin newborns' increased susceptibility to rotavirus diarrhea and improved nutritional status. This is probably due to Bangladesh's status as a developing nation with ongoing rotavirus exposure. Global immunization is necessary because, despite improvements in the nutritional quality of infants in low-income countries, rotavirus diarrhea will continue to be a health concern [20]. Other studies also found that, according to the Z-score, the incidence of rotavirus infection was 7.14% in groups with poor nutritional status and 19.86% in individuals with normal nutritional condition [11].

TABLE 4: The Characteristics of Breastfeeding Status.

Breast feeding Status	Frequency (n)	Percentage (%)
Yes	36	72%
No	14	28%
Total	50	100%

The majority of children have been exclusively breastfed, as indicated by Table 4, which describes the features of the state of exclusive breastfeeding with diarrhea. When compared to infants who only receive formula milk, exclusive breastfeeding effectively reduces the number of particular infections in infants. Breastfeeding until age two has been shown to lower child mortality from diarrhea and respiratory tract infections [21]. Breast milk contains secretory IgA antibodies (sIgA), which provide protection. This defense occurs at the mucosal level, where IgA will prevent bacteria from entering the circulation through the digestive tract's mucosa (wall). It turns out that breast milk (ASI) includes antibodies against a variety of viruses, such as rotavirus, poliovirus, coxsackie virus, rhinovirus, RSV, and influenza virus, in addition to providing protection against bacteria, parasites, and other infections. Breast milk will prevent these viruses from growing [22].

This, however, runs counter to research findings that found no evidence that nursing could shield children from rotavirus diarrhea [23].

According to another study, the incidence of rotavirus-positive participants who also experienced severe dehydration was 14.6% in infants who were exclusively breastfed and 21.5% in infants who were not. According to Prasetyo et al. (2015), there was no discernible difference in the prevalence of rotavirus-induced diarrhea with severe dehydration between infants who were exclusively breastfed and those who were not [24].

The findings of a meta-analysis of exclusive breastfeeding by other research, which found no significant difference between the case group and the control group, are comparable to this. According to this study, there is probably no connection between breastfeeding and the prevalence of rotavirus diarrhea [25]. According to recent research, children who are nursed have a higher incidence of rotavirus than toddlers who have been weaned [11].

TABLE 5: The Characteristics of Rotavirus Vaccination Status.

Rotavirus Vaccination	Frequency (n)	Percentage (%)
Yes	19	38%
No	31	62%
Total	50	100%

The majority of toddlers have not received the rotavirus vaccine, according to Table 5, which describes the features of the status of rotavirus vaccination with diarrhea. More than 28,000 deaths among children under five are thought to have been avoided thanks to the rotavirus vaccine, and its widespread use, particularly in sub-Saharan Africa, could avert roughly 20% of diarrheal deaths in this age group [26]. Another study claimed that the effectiveness of the rotavirus vaccine was demonstrated to lower the proportion of children who experienced diarrhea in comparison to those who were not immunized. Five years following immunization, children who received the rotavirus vaccine had a 90% lower chance of experiencing diarrhea in low-mortality nations, but only a 30% decrease in high-mortality ones [27].

This, however, runs counter to the findings of previous research, which indicate that the administration of the Rotavirus vaccine has no correlation with the prevalence of diarrhea in toddlers [28]. According to the aforementioned study, multifactorial variations in Rotavirus epidemiology, including high infectious power, malnourishment, co-infection with other pathogens, environmental enteropathy, maternal antibodies, and concurrent use of other vaccines that can reduce vaccine efficacy, also contribute to a lower likelihood of Rotavirus vaccine efficacy in low-income countries. Accordingly, this is among the causes of rotavirus infection in children who have received a rotavirus vaccination [29].

TABLE 6: The Characteristics of Source Drinking Water.

Source Drinking Water	Frequency (n)	Percentage (%)
Well	0	0%
PDAM	14	28%
Refill Water	24	48%
Packaged Water	12	24%
Total	50	100%

Table 6 provides a description of the features of the drinking water sources used by families with toddlers who have diarrhea. It demonstrates that the majority of toddlers with diarrhea originate from households that utilize replenished drinking water. High rates of waterborne illnesses, particularly diarrhea, are caused by poor drinking water quality [30]. According to research done in Kampung Baru Ngagelrejo Wonokromo Surabaya, respondents who used unclean water sources had a higher incidence of diarrhea (58.3%), whereas respondents who utilized clean water sources had a lower incidence (44.4%) [31]. This is consistent with studies conducted in Gorontalo, which found that drinking water sources that come from replenished water have a 3.44-fold increased risk of diarrhea [32]. This assertion is corroborated by research done in 2019 by Made, who tested 32 samples of refilled drinking water and discovered that 9 of them contained coliform bacteria and did not fulfill the required standards for drinking water quality [33].

TABLE 7: The Characteristics of Toilet Ownership.

Toilet Ownership	Frequency (n)	Percentage (%)
Yes	50	100%
No	0	0
Total	50	100%

All toddlers with diarrhea come from households that already have a toilet at home, according to Table 7, which describes the features of family toilet ownership in toddlers with diarrhea. The lack of toilets will result in human waste being exposed and make it easy for flies to reach the waste. Flies are vectors that cause diarrhea [34]. Other research conducted showed that houses with toilets with good building structures, namely partially repaired toilets, were found to be 52% less likely to report cases of diarrhea than houses with toilets that were not repaired [35]. According to other research, toilet ownership and the prevalence of diarrhea are significantly correlated. Diarrhea cases are decreased when restrooms are available. Flies, which are carriers of diarrhea, may fall on the openly disposed of excrement if there is no toilet [34].

TABLE 8: The Characteristics of Mother’s Educational.

Mother’s Educational	Frequency (n)	Percentage (%)
Elementary School	7	14%
Junior High School	7	14%
Senior High School	27	54%
Bachelor / Diploma	9	18%
Total	50	100%

The majority of mothers of toddlers with diarrhea have a high school or vocational school degree, or an equivalent, according to Table 8, which describes the features of the education level of mothers of toddlers with diarrhea. High-educated parents will have an easier time learning new facts that will help them better understand diarrhea, especially for moms. In order to ensure the health of the family, parents especially mothers who possess a wealth of information will also be more inclined to take preventative measures [36]. Compared to respondents with merely a high school diploma or basic and professional education, respondents with higher education are more likely to know a lot about probiotics [37]. According to previous research that supports this finding, women who are married, educated, and employed are more likely to have effective household management and preventative strategies for toddler diarrhea [38].

In contrast, around 17% of women with higher education levels had 5% of their children have diarrhea, according to the findings of a quantitative cross-sectional study employing secondary data. Higher-educated moms are supposedly less likely to give birth to children who have diarrhea. However, there was no discernible correlation between the mother's educational attainment and the prevalence of diarrhea in the study's population [27]. This aligns with the findings of a study by Aprilia Utami et al. (2023), which likewise showed that there was no significant correlation between the incidence of diarrhea and educational attainment [39].

TABLE 9: The Characteristics of Family Income.

Family Income	Frequency (n)	Percentage (%)
Above Minimum Wage	26	52%
Below Minimum Wage	24	48%
Total	50	100%

Table 9 describes the monthly family income characteristics of toddlers with diarrhea. Infants and toddlers from low-income homes are more likely to get diarrhea. It reveals that the majority of these toddlers have family incomes that are the same or higher than the minimum wage for Surabaya City. A family with a high-income level will also have access to good health facilities, including a toilet of their own, clean water, and a pen for their livestock to keep them clean [40]. This is consistent with earlier research showing that diarrheal mortality is much higher in children in low- and middle-income nations. Increased exposure to microorganisms that cause diarrhea, malnutrition, and limited access to treatment and preventive measures are some of the causes of this [40]. Backed by additional research demonstrating the substantial impact of socioeconomic factors on toddler diarrhea incidence. Diarrhea incidence decreases with improving socioeconomic position [40]. On the other hand, the opposite indicates that rotavirus infection cases are significantly increasing in North America with high incomes [41]. According to the same study's findings, there was no discernible correlation between wealth and the prevalence of diarrhea [39].

TABLE 10: The Characteristics of Mother's Job.

Mother's Job	Frequency (n)	Percentage (%)
Working	7	14%
Housewife	43	86%
Total	50	100%

Table 10 describes the employment status characteristics of mothers of toddlers with diarrhea. It reveals that the majority of toddlers with diarrhea are born to housewives or moms who are unemployed. According to research, children whose moms work and spend more than seven hours a day outside the home had a significantly lower risk of diarrhea than children whose mothers do not work [42]. Other research found that children of working moms are 4.72 times more likely to suffer from diarrhea than children of non-working mothers [43].

TABLE 11: The Characteristics of Mother's Level Knowledge.

Mother's Level Knowledge	Frequency (n)	Percentage (%)
Good	22	44%
Enough	25	50%
Less	3	6%
Total	50	100%

According to Table 11, which describes the features pertaining to the level of maternal awareness regarding diarrhea, most children who experience diarrhea are born to moms who possess adequate levels of knowledge. The morbidity and mortality of children who suffer from diarrhea can be decreased by educating mothers about the causes, prevention,

and treatment of diarrhea. This will help moms who have children under five years old [44]. According to studies, moms still don't know enough about preventing diarrhea, and the majority of them are unaware of the significant influence that preventing diarrhea has on personal cleanliness. Nearly half of mothers still don't know much about the rotavirus vaccine. This lack of maternal awareness raises the risk of rotavirus-induced diarrhea [44].

This, however, runs counter to research that found that while some mothers interviewed demonstrated a high level of knowledge and practice regarding acute diarrhea in children, some mothers still thought that diarrhea was caused by teething, preferred intravenous fluids over ORS to treat diarrhea-induced dehydration, and were unaware of the Rotavirus vaccine [45]. The findings of a study carried out at the Batoh Health Center in Banda Aceh City also indicated that there was no significant correlation between the incidence of toddler diarrhea and the level of mother knowledge. There may be other factors influencing the prevalence of diarrhea in toddlers besides the degree of maternal understanding [46].

TABLE 12: The Characteristics of Mother's Hand Washing Habit.

Mother's Handwashing	Frequency (n)	Percentage (%)
Yes	45	90%
No	5	10%
Total	50	100%

The majority of mothers of toddlers with diarrhea have followed proper handwashing procedures on a daily basis, according to Table 12, which describes the features of mothers' handwashing habits with soap and running water. Children are most impacted by poor handwashing practices, which increase the risk of contracting illnesses like respiratory and diarrheal disorders [47]. Mothers who do not wash their hands with soap are 6.6 times more likely to give birth to children who have diarrhea [48]. According to research, school-age children's handwashing habits and the prevalence of diarrhea are related [49]. Washing hands with soap after using the restroom, before cooking or eating, after changing diapers, or after cleaning up vomit can all help prevent the spread of rotavirus. According to current studies, hand disinfectants that contain alcohol are less effective at eradicating viruses than hand washing with soap and clean water [50]. Other research, however, claims that while handwashing practices can slow the virus's spread, they cannot totally prevent it [51].

CONCLUSIONS

There are various environmental and host risk factors for toddlers with diarrhea who visit Tanah Kali Kedinding Health Center. Needs particular consideration in relation to risk factors for rotavirus vaccine, exclusive breastfeeding, and nutritional condition.

Toddlers in the vicinity of the health clinic continue to have inadequate nutritional status. Additionally, rotavirus immunization and exclusive breastfeeding are still incomplete. Furthermore, the majority of toddler families continue to use reusable drinking water sources, which should be boiled beforehand to guarantee water safety. Parents should also make it a habit to wash their hands with soap and running water.

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REFERENCES

- [1] Diarrhoeal disease [Internet]. [cited 10 Desember 2024]. Available at: <https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease>
- [2] Kesehatan BP dan P. Laporan Riskesdas Nasional 2007. 2007
- [3] Profil Kesehatan Indonesia 2018 [Internet]. [cited 10 Desember 2024]. Available at: <https://www.kemkes.go.id/id/profil-kesehatan-indonesia-2018>
- [4] Habib MI, Kazi SG, Ahmed Khan KM, Zia N. Rota virus diarrhea in hospitalized children. *J Coll Physicians Surg Pakistan* [Internet]. Februari 2014 [cited 28 Maret 2023];24(2):114–7. <https://jhu.pure.elsevier.com/en/publications/rota-virus-diarrhea-in-hospitalized-children>
- [5] Stuempfig ND, Seroy J. Viral Gastroenteritis. *StatPearls* [Internet]. 21 Juni 2022 [cited 8 Mei 2023];<https://www.ncbi.nlm.nih.gov/books/NBK518995/>
- [6] Fidhow AM, Samwel A, Ng'ang'a Z, Oundo J, Nyangao J, Wences A. Molecular epidemiology and associated risk factors of rotavirus infection among children < 5 yrs hospitalized for acute gastroenteritis in North Eastern, Kenya, 2012. *Pan Afr Med J* [Internet]. 2017 [cited 1 Juni 2023];28(Suppl 1):3. Available at: </pmc/articles/PMC6113712/>
- [7] Vaccines and the Diseases They Prevent | Vaccines & Immunizations | CDC [Internet]. [cited 10 Desember 2024]. Available at: https://www.cdc.gov/vaccines/by-disease/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Fvaccines%2Fvpd%2Frotavirus%2Findex.html
- [8] Badan Penelitian dan Pengembangan Kesehatan -. Laporan Nasional Riskesdas 2018. Lemb Penerbit Balitbangkes [Internet]. 2018 [cited 10 Desember 2024];156. Available at: https://repository.badankebijakan.kemkes.go.id/id/eprint/3514/1/Laporan_Riskesdas_2018_Nasional.pdf
- [9] Ratri Adhiningsih Y, Fardah Athiyyah A. Diare Akut pada Balita di Puskesmas Tanah Kali Kedinding Surabaya Acute Diarrhea in Children Under-5 Years at Tanah Kali Kedinding Primary Health Care Surabaya. 2019 [cited 3 Juni 2023];1(2):96–101. Available at: <https://doi.org/10.36590/jika.v1i2.31http:ojs.yapenas21maros.ac.id/index.php/jika>
- [10] Girish Kumar CP, Giri S, Chawla-Sarkar M, Gopalkrishna V, Chitambar SD, Ray P, et al. Epidemiology of rotavirus diarrhea among children less than 5 years hospitalized with acute gastroenteritis prior to rotavirus vaccine introduction in India. *Vaccine* [Internet]. Desember 2020;38(51):8154–60. Available at: <https://linkinghub.elsevier.com/retrieve/pii/S0264410X20314043>
- [11] Fan Q. A Clinical Nursing Care Study on the Prevalence of Rotavirus Infection and Acute Diarrhea in Vaccinated Chinese Pediatric Population from 2019–2022. *Infect Drug Resist* [Internet]. Oktober 2022;Volume 15:6129–42. Available at: <https://www.dovepress.com/a-clinical-nursing-care-study-on-the-prevalence-of-rotavirus-infection-peer-reviewed-fulltext-article-IDR>
- [12] Ojobor CD, Olovo C V., Onah LO, Ike AC. Prevalence and associated factors to rotavirus infection in children less than 5 years in Enugu State, Nigeria. *VirusDisease* [Internet]. 6 September 2020;31(3):316–22. Available at: <https://link.springer.com/10.1007/s13337-020-00614-x>
- [13] Lestari HD, Susilowati L. Analisis Faktor Risiko Kejadian Diare pada Anak Usia dibawah Dua Tahun di Rumah Sakit Umum Daerah Koja Jakarta Utara. *Kesehat Kel* [Internet]. 2022;14(4):144–56. Available at: <http://ejournal.akperharumjakarta.ac.id>
- [14] Gupta A, Sarker G, Rout AJ, Mondal T, Pal R. Risk Correlates of Diarrhea in Children Under 5 Years of Age in Slums of Bankura, West Bengal. *J Glob Infect Dis* [Internet]. 1 Januari 2015 [cited 11 Juli 2023];7(1):23. Available at: </pmc/articles/PMC4338445/>
- [15] Gultom R, Khairani U. Evaluasi Kepatuhan Pasien Anak Penderita Diare Terhadap Penggunaan Antibiotik Di Rumah Sakit Umum (RSU) Karya Bakti Ujung Bandar Rantauprapat. *JIFI (Jurnal Ilm Farm Imelda)* [Internet]. 31 Maret 2021 [cited 21 Juni 2023];4(2):37–42. Available at: <https://www.mendeley.com/catalogue/e881d40f-b957-3f82-8cde-e436966ff6ab/>
- [16] Marenza VI, H FR, Yuliana T, P RM. Determinants of Diarrhea on Children Cases in Bojong Pondok Terong Work Area of Cipayung Community Health Center Depok City (Analysis of Data Practical Learning Practice in 2019). *Public Heal UPNVJ*. 2019;4(5):18–31.

- [17] Lestari FB, Vongpunsawad S, Wanlapakorn N, Poovorawan Y. Rotavirus infection in children in Southeast Asia 2008-2018: Disease burden, genotype distribution, seasonality, and vaccination. *J Biomed Sci.* 2020;27(1):1-19.
- [18] Peer V, Schwartz N, Green MS. A Pooled Analysis of Sex Differences in Rotaviral Enteritis Incidence Rates in Three Countries Over Different Time Periods. *Women's Heal Reports* [Internet]. 1 Februari 2022;3(1):228-37. <https://www.liebertpub.com/doi/10.1089/whr.2021.0096>
- [19] Juhariyah S, Mulyana SASF. Hubungan Status Gizi dengan Kejadian Diare pada Balita di Puskesmas Rangkasbitung. *J Obs Sci* [Internet]. 16 Juni 2018 [cited 11 Juli 2023];6(1):219-30. <https://ejurnal.latansamashiro.ac.id/index.php/OBS/article/view/359/354>
- [20] Verkerke H, Sobuz S, Ma JZ, Petri SE, Reichman D, Qadri F, et al. Malnutrition Is Associated with Protection from Rotavirus Diarrhea: Evidence from a Longitudinal Birth Cohort Study in Bangladesh. Tang Y-W, editor. *J Clin Microbiol* [Internet]. Oktober 2016;54(10):2568-74. <https://journals.asm.org/doi/10.1128/JCM.00916-16>
- [21] Review AS, The ON, Of B, Diarrhoea ON, Mortality P. Short-term effects of breastfeeding.
- [22] Alan R. Tumbelaka dan Mulya R. Karyanti. IDAI | Air Susu Ibu dan Pengendalian Infeksi [Internet]. 2013 [cited 10 September 2024]. <https://www.idai.or.id/artikel/klinik/asi/air-susu-ibu-dan-pengendalian-infeksi>
- [23] Wobudeya E, Bachou H, Karamagi CK, Kalyango JN, Mutebi E, Wamani H. Breastfeeding and the risk of rotavirus diarrhea in hospitalized infants in Uganda: a matched case control study. *BMC Pediatr* [Internet]. 17 Desember 2011;11(1):17. <https://bmcpediatr.biomedcentral.com/article/s/10.1186/1471-2431-11-17>
- [24] Prasetyo D, Sabaroedin IM, Ermaya YS, Soenarto Y. Association between Severe Dehydration in Rotavirus Diarrhea and Exclusive Breastfeeding among Infants at Dr. Hasan Sadikin General Hospital, Bandung, Indonesia. *J Trop Med* [Internet]. 2015;2015:1-4. <http://www.hindawi.com/journals/jtm/2015/862578/>
- [25] Shen J, Zhang B, Zhu S, Chen J. No direct correlation between rotavirus diarrhea and breast feeding: A meta-analysis. *Pediatr Neonatol* [Internet]. April 2018;59(2):129-35. <https://linkinghub.elsevier.com/retrieve/pii/S1875957217305223>
- [26] Troeger C, Khalil IA, Rao PC, Cao S, Blacker BF, Ahmed T, et al. Rotavirus Vaccination and the Global Burden of Rotavirus Diarrhea Among Children Younger Than 5 Years. *JAMA Pediatr* [Internet]. 1 Oktober 2018;172(10):958. <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2696431>
- [27] Ferdous J. Association between maternal level of education and recent episode of diarrhea among the children under age five in Bangladesh: Evidence from Bangladesh Uppsala Univeristy [Internet]. 2023;25. <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1769422>
- [28] Arini Novelia Yolla. Hubungan Pemberian Vaksin Rotavirus Dengan Kejadian Diare Pada Balita di Indonesia. 2020;4-5.
- [29] Varghese T, Kang G, Steele AD. Understanding Rotavirus Vaccine Efficacy and Effectiveness in Countries with High Child Mortality. *Vaccines* [Internet]. 1 Maret 2022 [cited 11 Juli 2023];10(3). <https://pmc/articles/PMC8948967/>
- [30] Azhar K, K DS, Hapsari D. Diare Balita Di Provinsi DKI Jakarta Ditinjau Dari Aspek Air Minum, Sanitasi Dan PHBS (Analisis Data Risesdas 2013). *J Ekol Kesehat* [Internet]. 17 Mei 2016 [cited 21 Juni 2023];14(1). https://www.researchgate.net/publication/313088056_DIARE_BALITA_DI_PROVINSI_DKI_JAKARTA_DITINJAU_DARI_ASPEK_AIR_MINUM_SANITASI_DAN_PHBS_ANALISIS_DATA_RISKESDAS_2013
- [31] Harsa IMS. The Relationship Between Clean Water Sources And The Incidence Of Diarrhea In Kampung Baru Resident At Ngagelrejo Wonokromo Surabaya. *J Agromedicine Med Sci.* 2019;5(3):124.
- [32] Labado N, Wulandari RA. Hubungan Sumber Air Minum Dengan Kejadian Diare Di Provinsi Gorontalo. *J Med Utama.* 2022;3(4):402-6.
- [33] Sari MAP. ABSTRACT IDENTIFICATION OF Coliform and Escherchia coli BACTERIA IN REFILL DRINKING WATER DEPOTS IN BANDAR LAMPUNG CITY By Made Ayu Purnama Sari ABSTRAK IDENTIFIKASI BAKTERI Coliform DAN Escherichia coli PADA DEPOT AIR MINUM ISI ULANG DI KOTA BANDAR LAMPU. (492).
- [34] Kasman, Ishak NI. Kepemilikan Jamban Terhadap Kejadian Dia. *Publ Kesehat Masy Indones.* 2020;7(1):28-33.
- [35] Cha S, Lee JE, Seo DS, Park BM, Mansiangi P, Hwang JS, et al. Associations between Household Latrines and the Prevalence of Diarrhea in Idiofa, Democratic Republic of the Congo: A Cross-Sectional Study. *Am J Trop Med Hyg* [Internet]. 2017 [cited 11 Juli 2023];97(2):460-8. Available at: <https://pubmed.ncbi.nlm.nih.gov/28722602/>

- [36] Utami N, Luthfiana N. Faktor-Faktor yang Memengaruhi Kejadian Diare pada Anak. Majority [Internet]. 2016;5:101–6. Available at: <https://www.mendeley.com/catalogue/fdd61f29-e548-30b4-9a02-3d11c3c9b4aa/>
- [37] Szewczak A, Bak J, Węgorowski P, Zarzycka D. The knowledge of mothers on prevention of diarrhea in infancy. *J Educ Heal Sport*. 2018;8(11):156–64.
- [38] Momoh FE, Olufela OE, Adejimi AA, Roberts AA, Oluwole EO, Ayankogbe OO, et al. Mothers' knowledge, attitude and home management of diarrhoea among children under five years old in Lagos, Nigeria. *African J Prim Heal Care Fam Med* [Internet]. 27 Mei 2022;14(1). Available at: <http://www.phcfm.org/index.php/PHCFM/article/view/3119>
- [39] Utami NRA, Sudarsono TA, Sulistiyowati R, Supriyadi S. Hubungan Kepemilikan Jamban dengan Kejadian Diare di Desa Bagan Laguh, Kecamatan Bunut, Riau. *J Surya Med* [Internet]. 27 April 2023 [cited 29 Agustus 2024];9(1):175–9. Available at: <https://journal.umpr.ac.id/index.php/jsm/article/view/5164>
- [40] Setyaningsih R, Diyono D. Faktor-Faktor Yang Mempengaruhi Kejadian Diare Pada Balita. *KOSALA J Ilmu Kesehat*. 2020;8(2):63–70.
- [41] Du Y, Chen C, Zhang X, Yan D, Jiang D, Liu X, et al. Global burden and trends of rotavirus infection-associated deaths from 1990 to 2019: an observational trend study. *Virol J* [Internet]. 20 Oktober 2022;19(1):166. Available at: <https://virologyj.biomedcentral.com/articles/10.1186/s12985-022-01898-9>
- [42] Hayati et al. Hubungan status pekerjaan ibu dengan kejadian diare pada anak di bawah tiga tahun (Batita) di Indonesia [Internet]. 2005. 2005 [cited 21 Juni 2023]. Available at: http://etd.repository.ugm.ac.id/home/detail_pencarian/27325
- [43] Pertiwi YA. PERBEDAAN KEJADIAN DIARE ANAK USIA 6 - 24 BULAN PADA IBU BEKERJA DAN IBU TIDAK BEKERJA DI WILAYAH KERJA PUSKESMAS SANGKRAH KOTA SURAKARTA. Vol. 53. UNS; 2013.
- [44] Salimath GB. (PDF) Effectiveness of a Teaching Program on Knowledge of Diarrhea and Prevention Among Mothers [Internet]. [cited 29 Agustus 2024]. Available at: https://www.researchgate.net/publication/344400598_Effectiveness_of_a_Teaching_Program_on_Knowledge_of_Diarrhea_and_Prevention_Among_Mothers
- [45] Alrafiaah AS, Albraikan A, Aljaafari A, AlAbbad A, Alfehaid H, Alqueflie S, et al. Assessment of Maternal Knowledge and Practices Regarding Acute Diarrheal Illnesses in Children in Saudi Arabia: A Tertiary Care Center Survey. *Cureus* [Internet]. 30 Desember 2022 [cited 18 September 2023];14(12). Available at: </pmc/articles/PMC9886366/>
- [46] Zahara H, Putri R, Destry R. Analysis Of The Relationship Of Mother's Knowledge With The Incident Of Diarrhea In Toddler In The Batoh Health Center, Kota Banda Aceh. *Pharmacol Med REPORTS Orthop Illn DETAILS* [Internet]. 28 November 2023;2(4). Available at: <https://ojs.transpublika.com/index.php/COMORBID/article/view/1109>
- [47] Amri N. Penyuluhan Perilaku Hidup Bersih (PHBS) Mencuci Tangan. *J Abdimas Saintika* [Internet]. 18 Desember 2019 [cited 21 Juni 2023];1(1):154–7. Available at: <https://www.jurnal.syedzasaintika.ac.id/index.php/abdimas/article/view/649>
- [48] Rifai R, Wahab A, Prabandari YS. Kebiasaan Cuci Tangan Ibu dan Kejadian Diare Anak di Kutai Kartanegara. *Ber Kedokt Masy*. 2018;32(11):409–14.
- [49] Nuraeni A, Rosiah R, Supendi MPK, Efendi A. THE RELATIONSHIP OF HAND WASHING BEHAVIOR TOWARDS DIARRHEA CASES IN SCHOOL-AGE CHILDREN. *J Vocat Nurs* [Internet]. 31 Oktober 2022 [cited 11 Juli 2023];3(2):105–9. Available at: <https://e-journal.unair.ac.id/JoViN/article/view/39527>
- [50] Tuladhar E, Hazeleger WC, Koopmans M, Zwietering MH, Duizer E, Beumer RR. Reducing viral contamination from finger pads: handwashing is more effective than alcohol-based hand disinfectants. *J Hosp Infect* [Internet]. Juli 2015;90(3):226–34. Available at: <https://linkinghub.elsevier.com/retrieve/pii/S0195670115001474>
- [51] UK Health Security Agency. Protecting your baby against rotavirus [Internet]. Available at: https://assets.publishing.service.gov.uk/media/61447f898fa8f503b1201623/UKHSA_12061_rotavirus_guide_Sept21.pdf