The Effect of Basic Sanitation, Caregiver's Behavior, And Children's Characteristics on The Occurrence of Diarrhea in Children Under Five

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ABSTRACT

Background: Diarrhea is one of the leading causes of death and high rates of morbidity in children under five worldwide. In Indonesia, diarrhea is an endemic disease that can increase mortality. The factors can influence the incidence of diarrhea, such as the characteristics of caregivers (education, work, behavior), characteristics of children under five (nutritional status, exclusive breastfeeding), and basic sanitation (clean water facilities, healthy latrines, sewage treatment, waste disposal). *Purpose:* To know the effect of basic sanitation, caregiver's behavior, and children's characteristic factors on the occurrence of diarrhea in children under five. *Research Method:* This study is an observational analysis with a cross-sectional study design in X Health Center Y city. They were taking a sample using simple random sampling with 450 caregivers and children under five who had diarrhea in the last three months. The caregivers filled out a questionnaire, and the researcher observed the basic sanitation in the respondents' houses. The data was analyzed by multivariate using a logistic regression test. *Result:* The multivariate showed that were four independent variables which significantly influenced the incidence of diarrhea, such as exclusive breastfeeding factor p=0,000 (p<0.05) OR 10,1(CI95% 3,64-27,98), latrine facilities p=0.003 (p<0.05) OR 5,1(CI95%1,71-15,17), garbage facilities p=0,000 (p <0.05) OR 23,2(CI95%7,19-74,6), and behavior p=0,000 (p<0.05) OR 188,3(CI95%48,66-729,33), R Square was 89.7%. *Conclusions:* There is a significant relationship between basic sanitation, caregiver's behavior, and children's characteristics with the occurrence of diarrhea in children under five. They should continuously educate the caregiver about clean and healthy behavior, counseling on the importance of exclusive breastfeeding for infants, and intervention for basic sanitation such as closing the waste disposal. It needs a Health Center and caregivers' support to prevent the occurrence of diarrhea in Children.

Keywords: Diarrhea; children under five; exclusive breastfeeding; basic sanitation; latrine facilities; garbage facilities; behavior.

INTRODUCTION

Diarrhea is one of the most significant causes of death and degree of morbidity in children under five years old all around the world. Deaths related to this are estimated to be 1.5 – 5.1 M deaths annually, especially in developing countries [1]. The sign of diarrhea is the disturbance of defecation more than three times daily with watery stool characteristics and accompanied by blood or mucus in the last 24 hours [2].

Diarrhea is endemic in Indonesia and is categorized as "*Kejadian Luar Biasa (*KLB)" and is mainly followed by death. According to the Indonesian Health Profile 2017, 21 KLBwerearrhoea cases spread around 12 provinces, 17 cities, and districts.

According to recapitulation data, KLB has been at a high degree (>1%) from 2008 until 2016, except in 2011, CFR at the KLB was around 0.40% [3]. Data from the Health Ministry of Y City shows that incidents of diarrhea at all ages in Y district are around 4.831 inflicted, and around 1.947 (40%) are infants [4]. In X Health Center, diarincidence among children under five reached 225 incidents (7.4%), higher than last year. Healthcare for diarrhea in 2017 – 2018 has not yet reached the desired result [5].

Affecting factors that contribute to diarrhea for children under five years old are the young age of their mother, low education, lack of knowledge, the lack of clean water, the habit of washing hands, socioeconomic factors, and the consumption of food and drinks [6].

Other than that, waste disposal and wastewater are also related to the prevalence of diarrhea in children under five years old[7]. Related behavior with diarrhea under five years old such as the habit of washing hands, how to feed children properly using utensils, especially in babies under five years old, the time taken to cook water, the usage of the water tanks, and the usage of toilets to defecate[7]. On the other hand, exclusive breast milk has also been proven to optimize the gastrointestinal system, preventing diarrhea early [8]

According to the information above, researchers were inspired to examine the factors that affect the prevalence of diarrhea in children under five years old.

RESEARCH METHODS
This is an analytic observational study with a cross-sectional study design. This was in the Work Area of Campurejo Health Center in Kediri City in February 2019. The sample of this research was 450 children under five who had diarrhea and did not have diarrhea in the last 3 months, using simple random sampling. Inclusion criteria: 1. All male or female children under five in the Work Area of Campurejo Health Center in Kediri City; 2. All male or female children under five / caregivers who want to take part in this research; 3. All male or female children under five who have had diarrhea or not in the last three months. Exclusion Criteria: all children under five who cannot complete the research and all mothers/caregivers of children under five who refuse to participate as respondents. Independent variables: 1. Basic sanitation (clean water facilities, healthy latrines, sewage treatment, waste disposal); 2. Characteristic of caregivers (education, work, behavior); 3. Characteristic of children under five (nutritional status, exclusive breastfeeding). The dependent variable is the incidence of diarrhea in children under five.

Primary data is taken from answering the questionnaire and checklist, and secondary data is taken from cards to health. In the data collection in this study, the instrument used a questionnaire and checklist about basic sanitation, including clean water facilities, healthy latrines, sewage treatment, and waste disposal, to show factors that can influence the occurrence of diarrhea in X Health Center Y City The population in this research was all children under five, then they were taken as a sample to fill the inclusion criteria. The caregiver is given a questionnaire, and the researcher observes basic sanitation in the respondent's house; then, data is processed and analyzed with SPSS version 24, and it is a discussion and then taken to a conclusion.

This research uses univariate tests with descriptive statistics in the form of frequency distributions to be presented in tabulation. Bivariate tests using unpaired categorical comparative with bxk table, namely chi-square and multivariate using predictive logistic regression analysis, to determine the factors that influence the incidence of diarrhea in infants. Then, the data is processed using the SPSS for Windows version 24 program.

RESULT
This study is an analytical descriptive research that aims to identify factors associated with the occurrence of diarrhea in children at X Health Center in the last three months. This research was obtained from 450 mothers/caregivers of children in the X Health Center, using simple random sampling. The results consist of the characteristics of the respondents, Chi-square analysis, and multivariate logistic regression analysis.

Table 1 shows that the number of respondents who had had diarrhea and no diarrhea were the same; 225 (50%) had suffered diarrhea in the last three months, and 225 (50%) had not suffered diarrhea in the last three months. Respondents with high education were 357 (79,3%), and respondents with low education were 93 (20,7%). Respondents were unemployed 302 people (67,1%) while 148 people (32,9%) were employed, children with adequate nutritional status 407 people (90,4%) and low nutritional status 43 people (9,6%), respondents (58,2%) breastfed and 188 respondents (41,8%) were never breastfed, the most respondents 225 (56,7%) have a good behavior compared with the bad behavior, which is 195 (43,3%).

TABLE 1: Characteristics of Respondents.

Variable	Characteristic	Frequency (%)	Total (%)
Diarrhea	Diarrhea	225(50%)	450 (100%)
	Not diarrhea	225 (50%)	
Education	High	357 (79,3%)	450 (100%)
	Low	93(20,7%)	
Employment	Unemployed	302(67,1%)	450 (100%)
	Employed	148(32,9%)	
Nutritional status	Adequate	407(90,4 %)	450 (100%)
	Low	43(9,6 %)	
Breastfeeding	Is/Was breastfeeding	262 (58,2 %)	450 (100%)
	Never breastfeeding	188 (41,8 %)	
Behavior	Good	255 (56,7 %)	450 (100%)
	Bad	195 (43,3 %)	

TABLE 2: Characteristics of Basic Sanitation.

Variable	Characteristic		Frequency (%)	Total (%)
Water Source	Qualified	Water Pump	321 (71,3%)	381 (85,7%)
		Piped Water	45 (10%)	
		Draw Well	15 (3%)	
	Not Qualified	Water Pump	52 (11,5%)	69 (15,3%)
		Piped Water	13 (2,8%)	
		Draw Well	4 (0,8%)	
Latrine	Qualified	Clean	374 (83,1%)	306 (68%)
		Ceramics Floor	423 (94%)	
		Septic tank >10m	331 (73,6%)	
	Not Qualified	Dirty	76 (16,9%)	144 (32%)
		Soil floor	27 (6%)	
		Septic tank <10m	119 (26,4%)	
Sewage Treatment	Qualified	Closed	343 (76,2%)	315 (70 %)
		Permanent	315 (94,7%)	
		Not smell	315 (84,2%)	
	Not Qualified	Open	107 (23,8%)	135 (30 %)
		Not permanent	24 (5,3%)	
		Smell	71 (15,8%)	
Waste Disposal	Qualified	Closed	281 (62,4%)	228 (50,7 %)
		Waterproof	329 (73,1%)	
		Not Scattered	413 (91,8%)	
	Not Qualified	Open	169 (37,6%)	222 (49,3 %)
		No waterproof	121 (26,9%)	
		Scattered	37 (8,2%)	

Table 2 shows that most of the respondents had qualified water sources: 381 (84,7%), 321 (71%) used water pumps, 45 (10%) used piped water, and 15 (3%) used a draw well. In comparison, 69 (15,3%) respondents did not qualified water source, 52 (11,5%) used water pump, 13 (2,8%) used piped water, and 4 (0,8%) used draw well, respondents having qualified latrine 306 (68%), which characterized is 374 (83,1%) clean, 423 (94%) ceramics floor, and 331 (73,6%) have distance with septic tank>10m. While 144 (32%) respondents have not qualified latrines, 76 (16,9%) restrooms were dirty, 27(6%) with soil floor, and 119 (26,4%) had a distance<10m with septic tank.

Table 2 shows that respondents having qualified sewage, 315 (70%), which is characterized 343 (76,2%) as closed, 315 (94,7%) as permanent, and 331 (73,6%) did not smell. While 135 (30%) respondents have yet to qualify for sewage, 107 (23,8%) are open, 24 (6%) are not permanent, and 71 (15,8%) smell. Respondents had 228 qualified waste disposal, 281 (62,4%) were closed, 329 (73,1%) were waterproof, and 413 (91,8%) were not scattered. While 222 (49,3%) respondents have waste disposal that needs to be qualified, 169 (37,6% have open waste disposal, 121 (26,9%) have no waterproof, and 37 (8,2%) are scattered.

TABLE 3: Chi-Square Analytic Test.

Factor	Criteria	Diarrhea		Total	p
		No	Yes		
Education	High	195 (54,6%)	162 (45,4%)	357 (100 %)	0.000
	Low	32 (32,3%)	63 (67,7%)	93 (100%)	
Employment	No	153 (50,7%)	149 (49,3%)	302 (100 %)	0.763
	Yes	72 (48,6%)	76 (51,4%)	148 (100 %)	
Nutritional Status	Adequate	221 (54,3%)	186 (45,7%)	407 (100 %)	0.000
	Low	4 (9,3%)	39 (90,7%)	43 (100 %)	
Breastfeeding	Yes	201 (76,7%)	61 (23,3%)	262 (100 %)	0.000
	No	24 (12,8%)	164 (87,2%)	188 (100 %)	
Water Source	Qualified	225 (59,1%)	156 (40,9%)	381 (100 %)	0.000
	Not Qualified	0 (0%)	69 (100%)	69 (100 %)	

| Factor | Criteria | Diarrhea | | Total | P |
		No	Yes		
Latrine	Qualified	205 (67%)	101 (33%)	306 (100 %)	0.000
	Not Qualified	209 (13,9%)	1249 (86,1%)	144 (100 %)	
Sewage Treatment	Qualified	205 (65,1%)	110 (34,9%)	315 (100 %)	0.000
	Not Qualified	20 (14,8%)	115 (85,2%)	135 (100 %)	
Waste Disposal	Qualified	194 (85,1 %)	34 (14,9 %)	288 (100 %)	0.000
	Not Qualified	31 (14 %)	191 (86 %)	222 (100 %)	
Behavior	Good	219 (85,9 %)	36 (14,1 %)	255 (100 %)	0.000
	Bad	6 (3,1 %)	189 (96,9 %)	195 (100 %)	

Based on Table 3, there was a cross-tabulation regarding the factors that influence the occurrence of diarrhea in children at the Work Area of X Health Center in Y City using the Chi-Square test. Data analysis showed a relationship between maternal education factors, nutritional status, breastfeeding, water source, latrine, sewage treatment, waste disposal, and maternal behavior towards diarrhea. In contrast, maternal occupation did not show a relationship. This can be seen in the table above:

The occurrence of diarrhea in respondents with higher education was 162 (45.4%), while those with low education were 63 (67.7%), p-value (0,000) significance.

The maternal employment variable showed that 149 respondents (49.3%) who had not worked had diarrhea, while respondents who worked 76 (51.4%) experienced diarrhea, p-value (0.763) significance.

Respondents with sufficient nutritional status had 186 (45.7%) diarrhea cases, while children with poor nutritional status had 39 (90.7%) had diarrhea, p-value (0,000).

Of respondents who received exclusive breastfeeding, 61 (23.3%) experienced diarrhea, while 164 (87.2%) who did not receive exclusive breastfeeding experienced diarrhea, p-value (0,000).

Respondents with a qualified water source that was diarrhea were 156 (40.9%), while those with clean water facilities but not qualified, 69 (100%) had diarrhea, p-value (0,000).

Respondents with qualified latrines that experienced diarrhea were 101 (33%), while those respondents with not qualified latrines that experienced diarrhea were 124 (86.1%), with a significance p-value (0,000).

Respondents with qualified sewage treatment who experienced diarrhea were 110 (34.9%), while those respondents who were not qualified for latrine 115 (85.2%) who experienced diarrhea, p-value (0,000)

Respondents who had qualified waste disposal experienced diarrhea 34 (14.9%), while those who didn't have qualified waste disposal, 191 (86%) experienced diarrhea, p-value (0,000).

The maternal behavior variable showed that 36 (14.1%) respondents experienced diarrhea, while those with bad behavior, 189 (96.9%) experienced diarrhea, with a p-value (0,000) significance.

TABLE 4: Multivariate Analytics Test.

| | B | Wald | Sig. | Exp (B) | 95% C.I. For EXP (B) | |
					Lower	Upper
Breastfeeding (1)	2.311	19.699	.000	10.085	3.635	27.982
Water Source (1)	17.522	.000	.997	40716777.330	.000	.
Latrine (1)	1.629	8.565	.003	5.099	1.713	15.179
Waste Disposal (1)	3.143	27.745	.000	23.168	7.195	74.605
Behavior (1)	5.239	57.532	.000	188.388	48.661	729.335
Constant	-4.842	61.683	.000	.008		

The multivariate test analysis with logistic regression was compared (highest code). It showed that exclusive breastfeeding, water source, latrine, waste disposal, and behavior, so the equation is obtained as follows:

Y = -4.842 + 2.311 (not having exclusive breastfeeding) + 1.629 (not qualified latrine) + 3.143 (not qualified waste disposal) + 5.239 (bad behavior)

From Table 4, it is known that variables that have a value of p <0.05 are:

Exclusive breastfeeding has sig. = 0,000, which means the respondents who were not exclusively breastfeeding had an influence on the incidence of diarrhea in children in the working area of X health center in Kediri city. The OR value obtained is 10.1, which means that the chances of children who do not get exclusive breastfeeding are higher than 10.1 times the diarrhea of children under five who get exclusive breastfeeding. Because OR> 1 can also be said children who do not get exclusive breastfeeding have a higher chance of having diarrhea.

The restroom has sig. = 0.003, which means that respondents who do not have qualified latrines influence the incidence of diarrhea in children in the working area of X health center in Y city. The OR value obtained is 5.1, which means that respondents who do not have qualified latrine availability have a chance of 5.1 times more diarrhea than respondents who have qualified latrines to experience diarrhea. Because OR> 1, it can also be said that respondents without qualified latrines have a chance of having diarrhea.

The Waste disposal has a sig. = 0,000, which means respondents who do not have qualified waste disposal influence the incidence of diarrhea in children in the working area of X health center in Kediri city.

The OR value obtained was 23.2, meaning that respondents who did not have qualified waste disposal had a chance of diarrhea of 23.2 times compared to respondents who fulfilled the requirements for qualified waste disposal to experience diarrhea. Because OR> 1 can also be said, the respondent who does not have qualified waste disposal can have a higher chance of experiencing diarrhea.

Behavior has sig. = 0,000, which means that respondents who misbehave behavior influence the occurrence of diarrhea in children in the working area of X health center in Y city. The OR value obtained was 188.3, meaning that respondents who misbehaved had a chance of diarrhea 188.3 times compared to respondents who behaved well and experienced diarrhea. Because OR> 1 can also be said that respondents who misbehave have a higher chance of the incidence of diarrhea.

To find out the probability of the incidence of diarrhea in each condition can be calculated through the Probability formula

$$= \frac{1}{1 + \exp(-y)}$$

For example, suppose toddlers do not get exclusive breastfeeding, and toilet facilities do not meet the requirements. If garbage facilities do not meet the requirements and have bad behavior, the chance of diarrhea is 99.9%. Furthermore, the results of probability calculations on several other conditions can be seen in the following table.

TABLE 5: Multivariate Probability Analysis Table for Diarrhea in Children at X Health Center in Y City.

No	Exclusive Breastfeeding	Latrine	Waste Disposal	Behavior	Formula: Y = α + β1X1 + β2X2 + β3X3 + β4X4	Probability of Diarrhea
1	Not Exclusive	N.Q.	N.Q.	Bad	Y = -4.842+ (2.311*1) + (1.629*1) + (3.143*1) + (5.239*1)	99,9%
2	Not Exclusive	Q	N.Q.	Bad	Y = -4.842+ (2.311*1) + (1.629*0) + (3.143*1) + (5.239*1)	99,7%
3	Exclusive	N.Q.	N.Q.	Bad	Y = -4.842+ (2.311*0) + (1.629*1) + (3.143*1) + (5.239*1)	99,4%
4	Not Exclusive	N	N.Q.	Good	Y = -4.842+ (2.311*1) + (1.629*1) + (3.143*1) + (5.239*0)	90,4%
5	Exclusive	N.Q.	Q	Bad	Y = -4.842+ (2.311*0) + (1.629*1) + (3.143*0) + (5.239*1)	88,3%
6	Not Exclusive	Q	N.Q.	Good	Y = -4.842+ (2.311*1) + (1.629*0) + (3.143*1) + (5.239*0)	64,8%
7	Exclusive	Q	Q	Bad	Y = -4.842+ (2.311*0) + (1.629*0) + (3.143*0) + (5.239*1)	59,8%
8	Not Exclusive	N.Q.	Q	Good	Y = -4.842+ (2.311*1) + (1.629*1) + (3.143*0) + (5.239*0)	28,9%
9	Exclusive	Q	N.Q.	Good	Y = -4.842+ (2.311*0) + (1.629*0) + (3.143*1) + (5.239*0)	15,5%
10	Not Exclusive	Q	Q	Good	Y = -4.842+ (2.311*1) + (1.629*0) + (3.143*0) + (5.239*0)	7,4%

TABLE 6: Nagelkerke R Square

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
121,476[a]	,673	,897

Based on the Wald test, only four significant variables are exclusive breastfeeding, latrine, waste disposal, and behavior, so if used as a percentage of 89.7% (Nagelkerke R Square), it would influence the occurrence of diarrhea in children.

DISCUSSION
This study aimed to determine the factors that influenced the incidence of diarrhea in children under five (toddlers) in the Work Area of the X Health Center Y City. The sample was 450 mothers/babysitters of toddlers. In this research, some factors such as mothers'/ babysitters' education and job, toddlers' nutritional status, exclusive breastfeeding, clean water facilities, latrines availability, wastewater disposal facilities (SPAL), waste disposal facility, and the behavior of mothers/babysitters of the toddler had a significant effect on the incidence of diarrhea (p <0.05). In contrast, occupational factors did not significantly influence diarrhea incidence (p = 0.688) in the X Health Center, Y City.

Table 3 shows that the mothers' education also influenced the incidence of diarrhea in toddlers in the X Health Center. This result is the same as the research conducted by Junita (2014) at the Bangun Purba Health Center, with a p-value of 0.003 [9]. In addition, research conducted in Dr. Cipto Mangunkusumo Hospital also showed a significant relationship between education and the incidence of diarrhea. In general, one's formal education level is positively related to the level of knowledge. In addition, education can also influence a person's behavior and lifestyle [10]. This result is also supported by Rohmah's research in Surabaya, which states that maternal education level is one of the factors that can affect the morbidity of toddlers [11]. Thus, the higher the maternal education level, the better the childcare and early management of diarrhea at home [12].

Table 3 showed no significant relationship between the mothers' jobs with diarrhea experienced by toddlers in X Health Center. The result is identical to the previous research conducted by Eva Yanti et al. (2014) in Tabanan, which showed no relationship between the mothers' jobs and the incidence of diarrhea experienced by toddlers [13]. Another study Siauta also showed insignificant results (p = 0.451), indicating no relationship between the mothers' jobs and the incidence of diarrhea [14]. Moreover, unemployed mothers have more time to bring their children to the health center routinely, thereby helping to minimize the mortality rate of children suffering from diarrhea [15].

The result shows a relationship between toddlers' nutritional status and the incidence of diarrhea in X Health Center Y City.

It is found that the p-value is 0,000 (<0.05), which means there is a relationship. This result is based on Herlina's research (2014) in Mataram, with a p-value of 0,000 16. In line with those results, Fatmawati (2015) stated that toddlers with poor nutritional status tend to experience a degradation of the immune system due to resistance and stress. Also, there is a degradation in the immune system and antibodies, so toddlers are easily infected by diarrhea [16]. Moreover, according to Mardiati (2017), the body has three defense systems to resist infection: through cells (cellular immunity), fluids (humoral immunity), and nucleus polymer leukocyte activity [17].

Table 3 showed that toddlers who did not receive exclusive breastfeeding turned out to affect the incidence of diarrhea. Rohma's research (2015) states that there is a relationship between toddlers who do not get exclusive breastfeeding and diarrhea incidence19. Based on the study of Pradirga (2014), respondents who gave additional food to infants under six months had a risk of 3,267 times getting diarrhea compared to respondents who only gave exclusive breast milk [18]. In addition, according to Selviana (2015), babies who were given water or herbal drinks were having 2-3 times more risks than babies who were given exclusive breast milk [19].

Based on table 3 shows a significant relationship between the clean water facilities and the incidence of diarrhea experienced by toddlers in the last three months. This is relevant to the research conducted by Afriani (2017) and Rahman et al (2016), which showed that the availability of clean water facilities affects the incidence of diarrhea in toddlers [20,21]. A family without clean water is five times at risk of being infected by diarrhea in toddlers [22]. The main problem of diarrhea in Indonesia is that many E. coli germs are still growing in some Indonesian water facilities [23].

In this study, the latrine ownership that did not meet the requirements significantly affected the incidence of diarrhea in toddlers. This result aligns with the previous research conducted by Pradirga in Makassar City, which shows that respondents who do not have restrooms or have unqualified latrines had a risk of 4,339 times infected by diarrhea [19]. Disposing of feces that are not by the rules will also facilitate the spread of some diseases that can be spread through feces, such as diarrhea [11].

Table 3 shows a relationship between the availability of wastewater disposal facilities and the incidence of diarrhea in the X Health Center. This result is from a previous study by Lintang (2016) in Rembang, Central Java, that found that well-qualified wastewater disposal facilities reduce the incidence of diarrhea [24].

Besides, a systematic review study conducted by Wolf (2014) showed a significant relationship between wastewater disposal and the incidence of diarrhea [25]. Based on the Minister of Health Regulation in 2018, the appropriate wastewater disposal facilities are closed, non-stagnant, odorless, not vectored, and connected to general waste/absorption wells. Thus, it helps to prevent the spread of vector diseases, such as diarrhea and so on [26].

Table 3 shows a relationship between waste disposal facilities and the incidence of diarrhea in toddlers. It is related to other studies that there is a significant relationship between waste management and the incidence of diarrhea in children under five in Pesisir Selatan Regency [27]. In addition, Aziz's research also shows that the incidence of diarrhea is increasing in toddlers from a family with unhealthy bins [28].

Lastly, the study's result shows a relationship between the behaviors of mothers/babysitters and the incidence of diarrhea in children under five in X Health Center. The result of this research is in line with another study, which stated that there is a relationship between hand-washing habits and the incidence of diarrhea in toddlers in Tabanan General Hospital [13], according to a study conducted by Taosu and Azizah, the respondents who washed their hands before eating had a lower chance of suffering from diarrhea (23.6%) if it is compared to those who sometimes washed their hands before eating (74.4%) [29]. According to a study by Nwaoha, Ohaeri, and Amaechifound, there is an effect between washing hands after defecating and before preparing children's food and incidents of diarrhea [30].

CONCLUSIONS
There is a significant relationship between basic sanitation, caregiver behavior, and children's characteristics with the occurrence of diarrhea in children under five. Health center workers should continuously educate the caregiver about clean and healthy behavior, counseling on the importance of exclusive breastfeeding for infants, and doing an intervention for basic sanitation such as closing the waste disposal. It needs a Health Center and caregivers' support to prevent the occurrence of diarrhea in Children.

SUGGESTIONS
(1) There needs to be more socialization and counseling to increase the knowledge of mothers/sitters about exclusive breastfeeding for children under five.

(2) More training should be needed to socialize the importance of health and nutritional status monitoring in children under five.

(3) There needs to be a periodic checkup on the nutritional status of children under five, as well as monthly reporting to monitor the development of the children.

(4) Clean water monitoring is needed to increase the coverage of clean water facilities that meet the requirements to prevent the transmission of diarrhea in children under five.

(5) Guidance on housing sanitation and basic sanitation and counseling are needed to increase the knowledge of mothers/sitters about the importance of maintaining the cleanliness of the home environment to prevent transmission of diarrhea.

(6) There needs to be an increase in socialization and counseling to increase the knowledge of mothers/sitters about healthy lifestyles to prevent the occurrence of diarrhea in children under five.

(7) It is necessary to provide understanding to the community about the importance of maintaining hand hygiene by providing leaflets and playing videos repeatedly on how to wash hands in all health facilities properly.

(8) It is necessary to provide early management of diarrhea for children under five at home to prevent complications of dehydration.

(9) It is necessary to increase the discovery and reporting of cases of diarrhea in children under five.

(10) To fill in the questionnaire, it is better to be supervised so that respondents can fill it more objectively.

REFERENCE
[1] Musonda C, Siziya S, Kwangu M, Mulenga D. Factors associated with diarrheal diseases in under-five children: a case control study at arthur davison children's hospital in Ndola, Zambia. Asian Pacific Journal of Health Sciences 2017; 4:228–34. https://doi.org/10.21276/apjhs.2017.4.3.34.

[2] Haile LM, Kamenov K, Briant PS, Orji AU, Steinmetz JD, Abdoli A, et al. Hearing loss prevalence and years lived with disability, 1990–2019: findings from the Global Burden of Disease Study 2019. The Lancet 2021; 397:996–1009. https://doi.org/10.1016/S0140-6736(21)00516-X.

[3] Kemenkes RI. Laporan nasional riskesdas 2018. Jakarta: Kemenkes RI 2018:154–66.

[4] Dinkes Kediri. Profil kesehatan Kota Kediri Tahun 2017, Dinas Kesehatan Kota Kediri. Http://WwwDepkesGoId/Resources/Download/Profil/PROFIL_KAB_KOTA_2017/3571_Jatim_Kota_Kediri_2017Pdf 2017.

[5] Anonim. Penilaian Kinerja Puskesmas Tahun 2018. Kediri: Puskesmas Campurejo 2018.

[6] George CM, Perin J, Neiswender de Calani KJ, Norman WR, Perry H, Davis TP, et al. Risk factors for diarrhea in children under five years of age residing in peri-urban communities in Cochabamba, Bolivia. Am J Trop Med Hyg 2014;91:1190–6. https://doi.org/10.4269/ajtmh.14-0057.

[7] Vasconcelos MJ de OB, Rissin A, Figueiroa JN, Lira PIC de, Batista Filho M. Fatores associados à diarreia em menores de cinco anos, no estado de Pernambuco, segundo inquéritos realizados em 1997 e 2006. Rev Saude Publica 2018;52:48. https://doi.org/10.11606/S1518-8787.2018052016094.

[8] Siregar AYM, Pitriyan P, Walters D. The annual cost of not breastfeeding in Indonesia: the economic burden of treating diarrhea and respiratory disease among children (< 24mo) due to not breastfeeding according to recommendation. Int Breastfeed J 2018;13:10. https://doi.org/10.1186/s13006-018-0152-2.

[9] Junita. Faktor - Faktor Yang Berhubungan Dengan Kejadian Diare Pada Balita Di Wilayahkerja Puskesmas Bangun Purba. Jurnal Maternity and Neonatal 2014;1:240–8.

[10] Hapsari. Hubungan Pengetahuan dan Sikap dengan Perilaku Orantua tentang Diare pada Balita di RSCM Kiara. Sari Pediatri 2018;19:16–20.

[11] Rohmah. Hubungan Kebiasaan Cuci Tangan Dan Penggunaan Jamban Sehat Dengan Kejadian Diare Balita. Departemen Epidemiologi Fakultas Kesehatan Masyarakat Universitas Airlangga. Jurnal Berkala Epidemiologi 2017;5:95–106.

[12] 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 2022. https://doi.org/10.7759/cureus.33116.

[13] Evayanti, Purna, Aryana. Faktor-faktor yang berhubungan dengan kejadian diare pada balita yang berobat ke Badan Rumah Sakit Umum Tabanan. Jurnal Kesehatan Lingkungan 2014;4:134–9.

[14] Siauta J. Hubungan Pendidikan dan Pekerjaan Ibu dengan Balita yang Mengalami Diare di Puskesmas Cempaka Putih Jakarta Pusat. . Jurnal Ilmiah Permata Medika 2015;4:1–12.

[15] Dwiriyanti. Gambaran Pengetahuan Ibu Terhadap Diare Akut Balita di RSUD Arifin Achmad Provinsi Riau dan Puskesmas Rawat Inap Pekanbaru. J Med 2015;2:1–13.

[16] Fatmawati. Faktor Yang Mempengaruhi Kejadian Diare Anak Usia 2-5 tahun di TK Raudhatul Athfal Alauddin Makassar. Journal Of Islamic Nursing 2015:21–32.

[17] Mardiati. Faktor-faktor Yang Berhubungan Dengan Kejadian Diare Pada Balita Puskesmas Babakansari. Jurnal Keperawatan BSI 2017;2:78–81.

[18] Pradirga. Faktor Risiko Kejadian Diare Pada Bayi Di Kelurahan Pannampu Kecamatan Tallo Kota Makassa. Skripsi Departemen Epidemiologi Fakultas Kesehatan Masyarakat Repository Universitas Hasanuddin 2014:1–12.

[19] Selviana. Determinan Terjadinya Penyakit Diare Akut Pada Balita di Wilayah Pesisir. Jurnal Vokasi Kesehatan 2015;1:161–8.

[20] Afriani B. Peranan Petugas Kesehatan dan Ketersediaan Sarana Air Bersih dengan Kejadian Diare,. Jurnal Ilmu Kesehata 2017;2:117–22.

[21] Rahman HF. Faktor-Faktor yang Berhubungan dengan Kejadian Diare di Desa Solor Kecamatan Cermee Bondowoso. Nurseline Journal 2016;1:24–35.

[22] Rohmah H, Hafsah T, Rakhmilla LE. Role of Exclusive Breastfeeding in Preventing Diarrhea. Althea Medical Journal 2015;2:78–81. https://doi.org/10.15850/amj.v2n1.436.

[23] Komarulzaman A, Smits J, de Jong E. Clean water, sanitation and diarrhoea in Indonesia: Effects of household and community factors. Glob Public Health 2017;12:1141–55. https://doi.org/10.1080/17441692.2015.1127985.

[24] Lintang L.S. Hubungan Kondisi Sanitasi Dasar Rumah Dengan Kejadian Diare Pada Balita Di Wilayah Kerja Puskesmas Rembang 2. Jurnal Kesehatan Masyarakat (e-Journal) 4 2016;4:160–5.

[25] Wolf J, Prüss-Ustün A, Cumming O, Bartram J, Bonjour S, Cairncross S, et al. Systematic review: Assessing the impact of drinking water and sanitation on diarrhoeal disease in low- and middle-income settings: systematic review and meta-regression. Tropical Medicine & International Health 2014;19:928–42. https://doi.org/10.1111/tmi.12331.

[26] Badan Penelitian Pengembangan dan Kesehatan Kementrian Kesehatan RI. Laporan Nasional Riskesdas 2018. Badan Penelitian Dan Pengembangan Kesehatan 2018:198.

[27] Dini, Machmud, Rasyid. Hubungan Faktor Lingkungan dengan Kejadian Diare Balita di Wilayah Kerja Puskesmas Kambang Kecamatan Lengayang Kabupaten Pesisir Selatan Tahun 2013. Jurnal Fakultas Kedokteran Unad 2015:453–61.

[28] Aziz FAA, Ahmad NA, Razak MAA, Omar M, Kasim NM, Yusof M, et al. Prevalence of and factors associated with diarrhoeal diseases among children under five in Malaysia: a cross-sectional study 2016. BMC Public Health 2018; 18:1363. https://doi.org/10.1186/s12889-018-6266-z.

[29] Taosu, Azizah. Hubungan Sanitasi Dasar Rumah Dan Perilaku Ibu Rumah Tangga Dengan Kejadian Diare Pada Balita Di Desa Bena Nusa Tenggara Timur. Jurnal Kesehatan Lingkungan 2013:1–6.

[30] Nwaoha AF, Ohaeri CC, Amaechi EC. Prevalence of diarrhoea, and associated risk factors, in children aged 0-5 years, at two hospitals in Umuahia, Abia, Nigeria. Cuadernos de Investigación UNED (ISSN: 1659-4266) 2017; 9:7–14.