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FACTORS ASSOCIATED WITH DIARRHEA MANAGEMENT IN CHILDREN UNDER FIVE YEARS IN INDONESIA

Faktor yang Berhubungan dengan Manajemen Diare pada Balita Usia Dibawah Lima Tahun di Indonesia

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ABSTRACT

Background: Diarrhea is the highest cause of death for toddlers globally. The proper management of diarrhea can prevent death from diarrhea, and the mother is the key to selecting handlers against diarrhea in the child. **Purpose:** This study aims to assess factors related to diarrhea management in children under five years in Indonesia. **Methods:** The type of research is observational analytics with a cross-sectional design. Maternal data analyzed in this study were 819 data obtained from the IDHS in 2017. Multivariable Logistic Regression is used to analyze the data. **Results:** Fifty-eight point five percent of all toddlers had poor diarrhea management. It consists of toddlers with a maternal age range of 20-24 years (p=0.04; AOR=2.37, 95%CI=1.03-5.41), and toddlers with a maternal age range of 30-34 years (p=0.03; AOR=2.47, 95%CI=1.07-5.68). Moreover, there are toddlers with a maternal age range of 45-49 years (p=0.03; AOR=13.34, 95%CI=1.25-146.80), toddlers with maternal age older than fathers (p=0.03; AOR=2.04, 95%CI=1.09-3.80), toddlers of mothers with several living children is 1-2 (p=0.02; AOR=2.59, 95%CI=1.19-5.62), and toddlers with a residence in rural areas (p=0.02; AOR=1.52, 95%CI=1.06-2.19) have a higher chance of getting poor diarrhea treatment. **Conclusion:** The factors of diarrhea management, such as the mother's age, the difference in age between men and women, number of living children, and residence, have a significant link with diarrhea in children under five years.

ABSTRAK

Latar Belakang: *Diare merupakan penyebab kematian balita tertinggi di dunia. Kematian akibat diare dapat dicegah dengan manjemen diare yang tepat, dan ibu merupakan kunci dari pemilihan penangan terhadap diare pada anak.* ***Tujuan:*** *Penelitian ini bertujuan untuk menilai faktor yang berhubungan dengan manajemen diare pada balita (anak usia dibawah 5 tahun) di Indonesia.* ***Metode:*** *Jenis penelitian ini merupakan observasional analitik dengan desain cross-sectional. Data ibu dianalisis dalam penelitian ini berjumlah 819 data, yang diperoleh dari IDHS tahun 2017. Regresi Logistik Multivariabel digunakan untuk menganalisis data.* ***Hasil:*** *Balita yang memperoleh manajemen diare yang buruk sebanyak 58,5%. Balita dengan rentang usia ibu 20-24 tahun (p=0,04; AOR=2,37, 95%CI=1,03-5,41), balita dengan rentang usia ibu 30-34 tahun (p=0,03; AOR=2,47, 95%CI=1,07-5,68), balita dengan rentang usia ibu 45-49 tahun (p=0,03; AOR=13,34, 95%CI=1,25-146,80) ,balita dengan usia ibu lebih tua daripada ayah (p=0,03; AOR=2,04, 95%CI=1,09-3,80), balita dari ibu dengan jumlah kelahiran hidup 1-2 anak (p=0,02; AOR=2,59, 95%CI=1,19-5,62), dan balita dengan tempat tinggal berada di kawasan pedesaan (p=0,02; AOR=1,52, 95%CI=1,06-2,19) memiliki peluang lebih tinggi memperoleh treatment diare yang buruk.* ***Kesimpulan:*** *Faktor-faktor manajemen diare, seperti usia ibu, perbedaan usia ibu dan ayah, jumlah anak di dalam keluarga, dan lokasi tempat tinggal memiliki hubungan yang signifikan terhadap manajemen diare pada anak usia di bawah 5 tahun.*

INTRODUCTION

Based on Indonesian Basic Health Research 2018, the prevalence of diarrhea in toddlers in Indonesia, based on a diagnosis by health officials, was 2.40% in 2013 and increased to 11% in 2018. The prevalence of diarrhea in toddlers based on diagnosis and symptoms was 18.50% in 2013 and reduced to 12.30% in 2018. (Kemenkes R.I., 2019). In addition, Indonesia Demographic and Health Survey (IDHS) data in 2017 revealed that the age range of 6-23 months accounted for (19-20%) of diarrhea occurrences (BKKBN, BPS, Kemenkes, & USAID, 2018)

Diarrhea causes malnutrition that will negatively affect the growth and development of children. Dehydration in toddler diarrhea cases might result in mortality (Wibowo, Hardiyanti, & Subhan, 2019). The death due to diarrhea can be avoided with appropriate and proper treatment.

Like Indonesia, underdeveloped nations are mostly treated independently at home. Family members, particularly mothers, are the key to treating their child's diarrhea (Suganya et al., 2017). Maternal knowledge has a significant impact on the incidence of diarrhea in children, and mothers with good knowledge and level of education will be able to protect their children (Astutik et al., 2020). Furthermore, the family has completed control over food, water supply, and personal cleanliness.

The family members' knowledge and perception are required to prevent and treat diarrhea to reduce diarrhea-related child fatalities. Based on this, the study aims to assess the variables associated with diarrhea management in toddlers (< 5 years) in Indonesia.

METHODS

This study used an analytical observational study with a cross-sectional design, utilizing secondary data from the 2017 Indonesia Demographic Health Survey (IDHS). Kid's Recode data sets were used in this study. All data was related to the respondents (mothers) willing to be interviewed in the data sets. All data gathered based on variables compiled into questionnaires, including certain variables related to children, parents, households, and access to health, are included in the data. This study's sample included 819 mothers between the ages of 15 and 49 who were successfully interviewed and had children under five.

DHS surveys were carried out in more than 90 countries. A complex sampling design approach based on the stratification of urban and rural areas was used for sampling. The DHS determined the sample in two phases, first using random cluster selection with Probability Proportional to Size (PPS) to identify the most significant cluster and randomly selecting households from an existing household list. Prior to data collection, respondents were informed about the Informed Consent. Ethical clearance was approved by ICF listed on the link https://dhsprogram.com/methodology/Protecting-the-Privacy-of-DHS-Survey-Respondents.cfm and the host country implementer.

The dependent variables in this study were the treatments given to children under 5 who suffered from diarrhea. Data on diarrhea management were gathered through interviews with mothers. Mothers who breastfed their children who were less than six months old or gave oral rehydration to their children who were more than six months old were said to have good diarrhea management. Moreover, if they did not do this, they are said to have poor diarrhea management.

Intriguing factors to be investigated in this study included child factors, parental factors, household factors, and access to health care services' factors. The child factors included age (0-6 months; ≥ six months), sex (male or female), and birth rank and interval (second or third child, interval > two years; first birth; second or third child, interval ≤ two years; fourth or higher child, interval > 2 years; fourth or higher child, interval ≤ 2 years).

Maternal and paternal factors included the husband or partner's educational achievement (incomplete primary education/none; complete primary or some secondary; complete secondary or above), wealth quintile (lowest, second, middle, fourth, or highest), husband/partner's occupation (agricultural or non-agricultural), age of mother (15-19; 20-24; 25-29; 30-34; 35-39; 40-49), women's occupation (not working, unskilled labour, or professional), women's education (no education, primary, secondary, higher), and differences in age between men and women (women older than men; 0-4; 4-7; > 7).

Household factors included the number of household members (household < 4 or household 4), source of drinking water (developed or undeveloped), number of living children (1-2; 2-4; 5+), type of bathroom facility (developed or undeveloped), and residence (urban or rural). Factors influencing access to health care services included the place of delivery (non-health facility or health facility) and the availability of trained personnel (non-health professional or health professional).

Multivariable logistic regression was used in data analysis to evaluate several independent variables related to dependent variables simultaneously. The covariance factors determining the relationship with diarrhea treatment in toddlers with a p-value of <0.25 based on univariate analysis will be included in the multivariate analysis. Stata 14 was used to analyze the data.

RESULTS

According to data collected from 819 respondents and evaluated, 58.45% of toddlers had inadequate diarrhea treatment. According to the children's factors, 87.55% are under the age of 6 months, 52.64% are male, and 48.48% are the second or third kid (interval > two years) (Table 1). Based on maternal and paternal factors, 52.81% of husbands/toddlers' fathers have completed primary or some secondary education levels, 27.60% are in the poorest wealth quintile, and 58.48 of husbands/toddlers' fathers work in agriculture. Thus, 23.95% of mothers aged 25-29 years, 55.80% of toddlers' mothers are unemployed, and 58.85% of toddlers' mothers have secondary education. Then, 42.69% of toddlers' parents have an age gap between 0-4 years (Table 1). Based on access to health care services' factors, 20.85% of respondents did not take their toddlers to health facilities, and health workers did not assist 10.15% during labour (Table 1). The distribution of factors based on the diarrhea treatment is listed in Table 2.

According to the result of multivariate analysis, the toddlers of mothers aged 20-24 years

(p = 0.04; AOR = 2.37, 95%CI=1.03-5.41),the toddlers of mothers aged 30-34 years (p = 0.03; AOR = 2.47, 95%CI=1.07-5.68), the toddlers of mothers aged 45-49 years (p = 0.03; AOR = 13.34, 95%CI=1.25-146.80), the toddlers of parents whose wives are older than their husbands (p = 0.03; AOR = 2.04, 95%CI=1.09-3.80), the toddlers born to mothers with 1-2 live births (p = 0.02; AOR = 2.59, 95%CI=1.19-5.62), and the toddlers in rural (p = 0.02; AOR = 1.521.06-2.19) were all associated with diarrhea management in children and have greater probability of receiving inadequate diarrhea management (Table 3).

DISCUSSION

There is a significant connection between the age of mothers, the age gap between men and women, the number of living children, and the residence to the diarrhea management in toddlers under five years old. The toddlers born to mothers above the age group of 15-19 years have a greater risk of getting poor diarrhea treatment. It shows a slight difference in results with research conducted in Ethiopia in 2017, which stated that mothers aged 25-35 years and 36-45 years are more likely to apply good practice in treating their children's diarrhea. In contrast, it shows different results with mothers aged > 45 years who are less likely to apply good practice in treating their children's diarrhea (Desta, Assimamaw, and Ashenafi 2017). According to a study conducted at the Ethiopian Center, young mothers (15-25 years old) were the most likely to delay getting treatment for their children's diarrhea (Degefa, Gebreslassie, Meles, & Jackson, 2018).

Toddlers of older mothers are more at risk of experiencing diarrhea (Thiam et al. 2017; Ferede 2020). Some studies show that age influences a person's health knowledge. In this study, mothers aged 44-49 years are shown to be the most at risk of providing inadequate treatment for their toddlers' diarrhea. It may be due to more open access to education for young mothers, but formal education is no longer easy to obtain for older ones.

Table 1
Distribution of Characteristics of Respondents

Variables	n	%
Management diarrhea		
Good management	340	41.55
Bad management	479	58.45
Child's Factors		
Age of children (month)		
0-6	102	12.45
>=6	717	87.55
Sex of child		
Male	431	52.64
Female	388	47.36
Birth rank and interval		
Second or third child, interval > 2 years	397	48.48
First birth	264	32.22
Second or third child, interval ≤2 years	30	3.69
Fourth or higher child, interval > 2 years	109	13.28
Fourth or higher child, interval ≤ 2 years	19	2.32
Maternal and Paternal Factors		
Husband/partner's educational attainment		
Incomplete primary education/none	67	8.14
Complete primary or some secondary	433	52.81
Completed secondary or higher	320	39.05
Wealth quintile		
Poorest	226	27.60
Poorer	176	21.43
Middle	184	22.45
Richer	147	17.95
Richest	87	10.58
Husband/partner's occupation		
Agricultural	479	58.48
Non Agricultural	340	41.52
Age of mother		
15-19	48	5.85
20-24	188	22.91
25-29	196	23.95
30-34	182	22.23
35-39	135	16.46
40-44	63	7.72
45-49	7	0.89
Women's occupation		
not working	457	55.80
unskilled labour	325	39.71

(Continued)

Table 1

Continued

Variables	n	%
Women's education		
No education	14	1.65
Primary	254	30.99
Secondary	482	58.85
Higher	70	8.51
Difference in age between man and woman (years)		
Women older than man	139	16.91
0-4	350	42.69
5-7	160	19.50
>7	171	20.90
Household Factors		
Number of household members		
Household < 4	102	12.49
Household ≥ 4	717	87.51
Source of drinking water		
Improved	379	46.24
Unimproved	441	53.76
Number of living children		
1-2	566	69.06
3-4	211	25.77
5+	42	5.17
Type of toilet facility		
Improved	501	61.16
Unimproved	318	38.84
Residence		
Urban	335	40.89
Rural	484	59.11
Access to Health Care Factors		
Place of delivery		
Non health facility	171	20.85
Health facility	649	79.15
Trained		
Non health professional	83	10.15
Health professional	736	89.85
Total	819	100.00

Proper diarrhea treatment may be reflected if the mother is well informed about it. Good knowledge may not necessarily reflect good attitudes and actions, but it is related to attitudes and actions in a beneficial way (Pramesti W et al., 2017). Mother with good knowledge and high level of education is more able to protect their child and use goo treatment approaches for thier child diarrhea, (Astutik et al., 2020; Ghimire et al. 2018; Misgna, Ebessa, and Kassa 2019).

5-7 years older than their husbands have a chance of receiving inadequate diarrhea treatment than those with an age gap of > 7 years. One of the factors that might indicate the primary strength in making a decision is the age gap between the toddler's mother and father, which can affect the type of their relationship. The relationship between the toddler's mother's head of household affects health-seeking behavior for child diarrhea (Akinyemi, Banda, De Wet, Akosile, & Odimegwu, 2019). In this study, the age of the older wives than their husbands has a significant link. It is associated with the highest risk of inadequate diarrhea treatment in toddlers under five years old. In a relationship with a woman older than a man, modern parenting roles in their families are common. Modern parenting roles are defined as a role swap where fathers remain at home and mothers work. One of the things that fathers do at home is babysitting. The relationship between a father and his son in a parenting activity is described positively as a consistent, strong, engaged, active, and pleasurable relationship. However, some researchers have found that men are less worried about their health than women.

The toddlers born to mothers with 1-2 and 3-4 live births are more likely to get inadequate diarrhea treatment than those born to mothers with 5+ live births. Significant results were shown by mothers with 1-2 live births. It is in line with research conducted in Northwest Ethiopia. Mothers with 3-4 live births were more likely to have inadequate diarrhea treatment practices, although the analytic findings did not indicate any significant connection (Desta et al., 2017). Research conducted in Nyanza, Kenya, also showed a similar result about a household with >1 child under-fives years is more likely to have inappropriate diarrhea treatment (Kawakatsu, Tanaka, Ogawa, Ogendo, & Honda, 2017).

A mother's number of live births influences her experience in managing family health problems, particularly those involving children. Mothers with 1-2 live births certainly have less experience with diarrhea management in children than those who have 3-4 or 5+ live births. Mother's experience in diarrhea management can be assumed to be related to the frequency of toddlers experiencing diarrhea. In several studies, toddlers from mothers with >3 children under five in the household were more likely to experience frequent diarrhea (Asfaha et al., 2018; Ferede, 2020).

Table 2
Distribution of Factor by Diarrhea Treatment

Variables	n	Diarrhea Management					
		Good			Bad		
		n	%	95%CI	n	%	95%CI
Age of children (months)							
0-6	102	99	97.54	[91.05,99.36]	3	2.46	[0.64,8.95]
>=6	717	241	33.59	[29.46,37.98]	476	66.41	[62.02,70.54]
Pearson: Uncorrected chi-square(1) = 154.02 ; Design-based F(1.00, 565.00) = 126.11 Pr = 0.00							
Sex of child							
Male	431	169	39.21	[33.87,44.83]	262	60.79	[55.17,66.13]
Female	388	171	44.15	[38.05,50.42]	217	55.85	[49.58,61.95]
Pearson: Uncorrected chi-square(1) = 2.10 ; Design-based F(1.00, 565.00) = 1.43 Pr = 0.23							
Birth rank and interval							
Second or third child, interval more than 2 years	397	161	40.65	[34.85,46.72]	236	59.35	[53.28,65.15]
1st birth	264	106	39.99	[32.75,47.69]	158	60.01	[52.31,67.25]
2nd or 3rd child, interval less or same 2 years	30	14	48.12	[29.62,67.15]	16	51.88	[32.85,70.38]
4th or higher child, interval more than 2 years	109	50	46.21	[35.87,56.88]	59	53.79	[43.12,64.13]
Fourth or higher child, interval less or same 2 years	19	9	44.91	[24.00,67.79]	10	55.09	[32.21,76.00]
Pearson: Uncorrected chi-square(4) = 2.05 ; Design-based F(3.94, 2224.94) = 0.39 Pr = 0.82							
Age of mother (years old)							
15-19	48	28	58.84	[40.22,75.24]	20	41.16	[24.76,59.78]
20-24	188	72	38.22	[30.08,47.09]	116	61.78	[52.91,69.92]
25-29	196	74	37.62	[29.89,46.03]	122	62.38	[53.97,70.11]
30-34	182	75	41.13	[32.97,49.82]	107	58.87	[50.18,67.03]
35-39	135	64	47.32	[37.39,57.47]	71	52.68	[42.53,62.61]
40-44	63	27	42.68	[29.17,57.39]	36	57.32	[42.61,70.83]
45-49	7	1	12.88	[1.45,59.67]	6	87.12	[40.33,98.55]
Pearson: Uncorrected chi-square(6) = 12.66 ; Design-based F(5.91, 3337.97) = 1.45 Pr = 0.19							
Husband or partner's educational attainment							
Incomplete/ none	67	29	43.89	[31.58,56.99]	38	56.11	[43.01,68.42]
Complete primary or some secondary	433	162	37.45	[31.71,43.56]	271	62.55	[56.44,68.29]
Completed secondary or higher	320	149	46.61	[40.15,53.18]	171	53.39	[46.82,59.85]
Pearson: Uncorrected chi-square(2) = 6.68 ; Design-based F(1.97, 1110.68) = 2.37 Pr = 0.09							
Wealth quintile							
Poorest	226	82	36.23	[29.53,43.50]	144	63.77	[56.50,70.47]
Poorer	176	75	42.40	[33.88,51.39]	101	57.60	[48.61,66.12]
Middle	184	86	46.63	[37.49,55.99]	98	53.37	[44.01,62.51]
Richer	147	65	44.18	[34.35,54.48]	82	55.82	[45.52,65.65]
Richest	87	33	38.49	[27.44,50.87]	54	61.51	[49.13,72.56]
Pearson: Uncorrected chi-square(4) = 5.52 ; Design-based F(3.96, 2235.13) = 0.93 Pr = 0.44							
Husband or partner's occupation							
Agricultural	479	203	42.43	[36.97,48.09]	276	57.57	[51.91,63.03]
Non-agricultural	340	137	40.30	[34.19,46.73]	203	59.70	[53.27,65.81]
Pearson: Uncorrected chi-square(1) = 0.38 ; Design-based F(1.00, 565.00) = 0.25 Pr = 0.61							

(Continue)

Table 2
Continued

Variables	n	Diarrhea Management					
		Good			Bad		
		n	%	95%CI	n	%	95%CI
The difference in age between man and woman							
Women older than man	139	44	31.54	[23.11,41.39]	95	68.46	[58.61,76.89]
0-4 years	350	148	42.30	[36.05,48.80]	202	57.70	[51.20,63.95]
5-7 years	160	68	42.38	[33.14,52.19]	92	57.62	[47.81,66.86]
>7 years	171	81	47.34	[37.53,57.35]	90	52.66	[42.65,62.47]
Pearson: Uncorrected chi-square(3) = 8.40 ; Design-based F(2.98, 1682.23) = 1.72 Pr = 0.16							
Number of household members							
Household < 4	102	39	37.90	[27.09,50.06]	63	62.10	[49.94,72.91]
Household ≥ 4	717	302	42.07	[37.75,46.52]	415	57.93	[53.48,62.25]
Pearson: Uncorrected chi-square(1) = 0.66 ; Design-based F(1.00, 565.00) = 0.44 Pr = 0.51							
Source of drinking water							
Improved	379	157	41.42	[35.41,47.69]	222	58.58	[52.31,64.59]
Unimproved	441	184	41.66	[36.05,47.50]	257	58.34	[52.50,63.95]
Pearson: Uncorrected chi-square(1) = 0.01 ; Design-based F(1.00, 565.00) = 0.00 Pr = 0.95							
Number of living children							
1-2	566	220	38.86	[33.79,44.19]	346	61.14	[55.81,66.21]
3-4	211	99	46.83	[38.88,54.94]	112	53.17	[45.06,61.12]
5+	42	22	51.14	[34.98,67.06]	20	48.86	[32.94,65.02]
Pearson: Uncorrected chi-square(2) = 5.84 ; Design-based F(1.98, 1117.14) = 2.06 Pr = 0.13							
Type of Toilet Facility							
Improved	501	217	43.27	[37.85,48.85]	284	56.73	[51.15,62.15]
Unimproved	318	124	38.84	[33.09,44.92]	194	61.16	[55.08,66.91]
Pearson: Uncorrected chi-square(1) = 1.61 ; Design-based F(1.00, 565.00) = 1.22 Pr = 0.27							
Residence							
Urban	335	160	47.84	[41.57,54.18]	175	52.16	[45.82,58.43]
Rural	484	180	37.20	[31.76,42.98]	304	62.80	[57.02,68.24]
Pearson: Uncorrected chi-square(1) = 9.46 ; Design-based F(1.00, 565.00) = 6.04 Pr = 0.01							
Respondent's occupation							
Not Working	457	189	41.44	[35.94,47.17]	268	58.56	[52.83,64.06]
Unskilled Labour	325	133	41.05	[34.91,47.48]	192	58.95	[52.52,65.09]
Professional	37	18	47.30	[29.18,66.15]	19	52.70	[33.85,70.82]
Pearson: Uncorrected chi-square(2) = 0.55 ; Design-based F(1.99, 1124.05) = 0.19 Pr = 0.83							
Women education							
no education	14	3	24.04	[8.39,52.24]	11	75.96	[47.76,91.61]
Primary	254	107	42.13	[34.25,50.43]	147	57.87	[49.57,65.75]
secondary	482	199	41.38	[36.10,46.85]	283	58.62	[53.15,63.90]
Higher	70	31	44.02	[31.88,56.92]	39	55.98	[43.08,68.12]
Pearson: Uncorrected chi-sqaure(3) = 1.97 ; Design-based F(2.84, 1607.15) = 0.49 Pr = 0.68							
Place of delivery							
Non Health Facility	171	60	34.81	[27.57,42.82]	111	65.19	[57.18,72.43]
Health Facility	649	281	43.32	[38.51,48.27]	368	56.68	[51.73,61.49]
Pearson: Uncorrected chi-square(1) = 4.14 ; Design-based F(1.00, 565.00) = 3.25 Pr = 0.07							
Trained							
non health profesional	83	26	30.85	[19.76,44.68]	57	69.15	[55.32,80.24]
health profesional	736	316	42.76	[38.29,47.35]	412	57.24	[52.65,61.71]
Pearson: Uncorrected chi-square(1) = 4.47 ; Design-based F(1.00, 565.00) = 2.60 Pr = 0.11							

Table 3
Association between the Factors with Diarrhea Management

Variables	AOR	95% CI	P value
Age of Mother			
15-19	Ref		
20-24	2.37*	1.03 - 5.41	0.04
25-29	2.26	0.99 - 5.18	0.05
30-34	2.47*	1.07 - 5.68	0.03
35-39	2.10	0.83 - 5.29	0.12
40-44	2.77	0.98 - 7.80	0.05
45-49	13.54*	1.25 - 146.80	0.03
The Difference in age between man and woman			
women older than man	2.04*	1.09 - 3.80	0.03
0-4 years	1.30	0.79 - 2.14	0.29
5-7 years	1.27	0.73 - 2.20	0.39
>7 years	Ref		
Number of Living Children			
1-2	2.59*	1.19 - 5.62	0.02
3-4	1.62	0.75 - 3.53	0.22
5+	Ref		
Residence			
Urban	Ref		
Rural	1.52*	1.06 - 2.19	0.02
Place of Delivery			
Non Health Facilities	1.18	0.68 - 2.05	0.56
Health Facilities	Ref		
Trained			
Non-Health Professional	1.18	0.68 - 2.05	0.56
Health Professional	Ref		
Constants	0.16***	0.05 - 0.47	0.00
Observations	839		
Population Size	819.5		

*** p<0,001, ** p<0,01, *p<0,05

Toddlers in rural areas have a higher chance of getting inadequate diarrhea treatment than those in urban areas. This result is different from a study in Myanmar, which found that children living in rural areas had a higher odds of receiving diarrhea treatment from health providers (Lwin et al., 2020). A similar result was found in the study conducted in Ethiopia. Mothers who live in urban had a higher probablity of getting healthcare seeking for their child's diarrhea than those in rural areas (Woldeamanuel, 2020). Children with diarrhea who live in rural areas had a higher chance of receiving treatment and were more likely to have an early treatment than those in urban areas (Hamooya, Masenga, & Halwiindi, 2020). Accessing health services is easier to get in urban than rural areas. It is due to the greater availability of health care professionals in urban areas. Mothers living in urban areas have twice as easy access to health information (Kebede Fufa,

Berhe Gebremedhin, Gebregergs, & Marama Mokonnon, 2019).

Other studies on diarrhea management frequently focus on maternal knowledge factors and the medical skills of health personnel who handle the diarrhea of toddlers. In this study, the researchers did not focus on the directly involved factors. Instead, they assessed additional factors such as child factors, parental factors, household factors, residency factors, and access to health care services' factors.

Based on the findings of this study, authorities should consider Human Resource Development (HRD) programs and the development of health facilities and infrastructure to improve family health, particularly that of children. Furthermore, improvements in communication strategies for social change in various media are required to raise public awareness of family health, particularly children's health.

Research Limitations

Because the DHS utilized a cross-sectional design, it was difficult to infer the causes and consequences of co-occurring. Diarrhea management in children in the DHS was determined using the self-survey method or the recall method, leading to information bias because mothers were asked to recall their child's condition and previous diarrhea treatment. It raises doubts about their claims about handling their child's diarrhea. On the other hand, this study has reasonably high response rates and a low measurement bias. All procedures and instruments were validated. Before the survey, the field workers were also educated to ensure that they would have a consistent grasp of the operational concept of the variable.

CONCLUSION

Good diarrhea management in children under the age of 5 can minimize morbidity and mortality caused by diarrhea. Based on the current findings of this study, maternal age, parental age gaps, the number of children in the family, and the location of residence all have a strong link with the management of diarrhea in children under the age of five. In addition, these variables are related to the household structure and dominant role, the knowledge and experience of mothers and fathers in dealing with diarrhea, and the available health services and infrastructures, all of which will impact the diarrhea management performed on toddlers.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHOR CONTRIBUTION

SA contributed significantly to interpreting the data, writing-original draft preparation, and editing. EA contributed to the design, conceptualization and process of analysis. RK contributed to the validation and reviewing.

REFERENCES

Akinyemi, J. O., Banda, P., De Wet, N., Akosile, A. E., & Odimegwu, C. O. (2019). Household relationships and healthcare seeking behaviour for common childhood illnesses in sub-Saharan Africa: A cross-national mixed effects analysis. *BMC Health Services Research*, *19*(1), 1–11. https://doi.org/10.1186/s12913-019-4142-x

Asfaha, K. F., Tesfamichael, F. A., Fisseha, G. K., Misgina, K. H., Weldu, M. G., Welehaweria, N. B., & Gebregiorgis, Y. S. (2018). Determinants of childhood diarrhea in Medebay Zana District, Northwest Tigray, Ethiopia: a community based unmatched case–control study. *BMC Pediatrics*, *18*(1), 120. https://doi.org/10.1186/s12887-018-1098-7

Astutik, E., Efendi, F., Sebayang, S. K., Hadisuyatmana, S., Has, E. M. M., & Kuswanto, H. (2020). Association between women's empowerment and diarrhea in children under two years in Indonesia. *Children and Youth Services Review*, *113*(April), 105004. https://doi.org/10.1016/j.childyouth.2020.105004

BKKBN, BPS, Kemenkes, & USAID. (2018). Survey Demografi dan Kesehatan Indonesia. In *Survei Demografi dan Kesehatan Indonesia 2017*. https://doi.org/0910383107 [pii]\r10.1073/pnas.0910383107

Degefa, G., Gebreslassie, M., Meles, K. G., & Jackson, R. (2018). Determinants of delay in timely treatment seeking for diarrheal diseases among mothers with under-five children in central Ethiopia: A case control study. *PloS One*, *13*(3), e0193035.

Desta, B. K., Assimamaw, N. T., & Ashenafi, T. D. (2017). Knowledge, Practice, and Associated Factors of Home-Based Management of Diarrhea among Caregivers of Children Attending Under-Five Clinic in Fagita Lekoma District, Awi Zone, Amhara Regional State, Northwest Ethiopia, 2016. *Nursing Research and Practice*, *2017*, 1–8. https://doi.org/10.1155/2017/8084548

Ferede, M. M. (2020). Socio-demographic, environmental and behavioural risk factors of diarrhoea among under-five children in rural Ethiopia: Further analysis of the 2016

Ethiopian demographic and health survey. *BMC Pediatrics*, *20*(1), 1–9. https://doi.org/10.1186/s12887-020-02141-6

Ghimire, P. R., Agho, K. E., Renzaho, A. M. N., Dibley, M., & Raynes-Greenow, C. (2018). Association between health service use and diarrhoea management approach among caregivers of under-five children in Nepal. *PLoS ONE*, *13*(3), 1–11. https://doi.org/10.1371/journal.pone.0191988

Hamooya, B. M., Masenga, S. K., & Halwiindi, H. (2020). Predictors of diarrhea episodes and treatment-seeking behavior in under-five children: a longitudinal study from rural communities in Zambia. *Pan African Medical Journal*, *36*(1).

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), 1–14. https://doi.org/10.1186/s12889-017-4107-0

Kebede Fufa, W., Berhe Gebremedhin, G., Gebregergs, G. B., & Marama Mokonnon, T. (2019). Assessment of poor home management practice of diarrhea and associated factors among caregivers of under-five years children in urban and rural residents of Doba Woreda, Ethiopia: Comparative cross-sectional study. *International Journal of Pediatrics*, *2019*.

Kemenkes R.I. (2019). Riset Kesehatan Dasar 2018. *Badan Penelitian Dan Pengembangan Kesehatan*, p. 198.

Lwin, K. S., Nomura, S., Yoneoka, D., Ueda, P., Abe, S. K., & Shibuya, K. (2020). Associations between parental socioeconomic position and health-seeking behaviour for diarrhoea and acute respiratory infection among under-5 children in Myanmar: a cross-sectional study. *BMJ Open*, *10*(3), e032039.

Misgna, H. G., Ebessa, B., & Kassa, M. (2019). Prevalence of oral rehydration therapy use and associated factors among under-five children with diarrhea in Dangure, Benishangul Gumuz Region, Ethiopia/2018. *BMC Research Notes*, *12*(1), 1–6. https://doi.org/10.1186/s13104-019-4078-6

Pramesti W, A., Ayu, D., Faradevy, N., & Anitarini, F. (2017). Pemberian pendidikan kesehatan terhadap perilaku ibu dalam penanganan diare pada anak usia 0-5 tahun. *Adi Husada Nursing Journal*, *3*(109), 11–15.

Suganya, V., Baby, B., D, R., K, R., S, I., & Kumar, N. (2017). Knowledge on rotavirus and pneumococcal vaccines among mothers of under five children. *International Journal of Contemporary Pediatrics*, *4*(5), 1739. https://doi.org/10.18203/2349-3291.ijcp20173776

Thiam, S., Diène, A. N., Fuhrimann, S., Winkler, M. S., Sy, I., Ndione, J. A., … Cissé, G. (2017). Prevalence of diarrhoea and risk factors among children under five years old in Mbour, Senegal: A cross-sectional study. *Infectious Diseases of Poverty*, *6*(1), 1–12. https://doi.org/10.1186/s40249-017-0323-1

Wibowo, D., Hardiyanti, H., & Subhan, S. (2019). Hubungan Dehidrasi Dengan Komplikasi Kejang Pada Pasien Diare Usia 0-5 Tahun Di RSD Idaman Banjarbaru. *Dinamika Kesehatan Jurnal Kebidanan Dan Keperawatan*, *10*(1), 112–125. https://doi.org/10.33859/dksm.v10i1.387

Woldeamanuel, B. T. (2020). Trends and factors associated with healthcare utilization for childhood diarrhea and fever in Ethiopia: further analysis of the demographic and health surveys from 2000 to 2016. *Journal of Environmental and Public Health*, *2020*.